

# THE TOOL ENGINEER

REG. U.S. TRADE MARK

OFFICIAL PUBLICATION: AMERICAN  SOCIETY OF TOOL ENGINEERS

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## Why accuracy "stays put" in the P&W Jig Borer

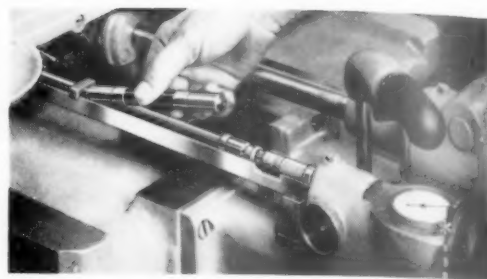
**Here's a view** Pratt & Whitney customers seldom get. But it shows up hidden strength... a mighty important feature of the P&W Jig Borer. The web-like ribbing is an integral part of the bed.

This machine carries a big load — column, table, carriage, and work — which it must support accurately in various positions. It is vital to precision boring that the machine *stay put*. That's the "why" of this unusual construction. Carriage, table and column are ribbed the same way.

The ribbing is planned and designed to give the greatest support and stability exactly where the load requires it. It is one more example of the hidden quality that is responsible for Pratt & Whitney Jig Borer accuracy.

The original jig borer was conceived and built by Pratt & Whitney about 30 years ago. It was a revolutionary development, and changed the whole toolroom concept of precision boring. Pratt & Whitney has been building jig borers ever since... with many *tested* improvements in convenience, speed and durability. The P&W Jig Borer is the most accurate of today's machine tools... will retain its initial accuracy through a long useful life... does the fast precision boring modern tool shop work demands... is an essential toolroom machine... first choice of experienced tool engineers. Complete literature is available... with many facts you should know about precision boring.

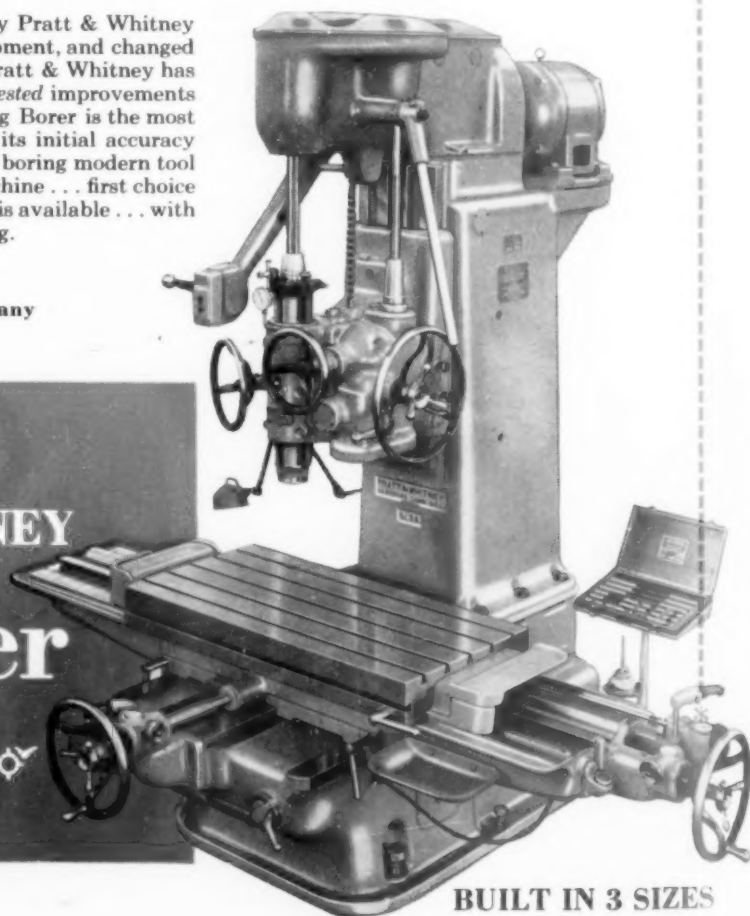
**PRATT & WHITNEY**  
Division Niles-Bement-Pond Company  
West Hartford 1, Conn.



P&W Jig Borers use the time-proved P&W spacing method... basic measuring instruments... end measures for even inches, inside micrometers for inch fractions, plus dial indicators for measuring pressure control and visible safeguard against errors.

**Tool Shop Essential**  
**PRATT & WHITNEY**  
**Jig Borer**

Locates + Bores ♦ Checks ♦



**BUILT IN 3 SIZES**



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## Editorial

# And It Shall Come to Pass

THE BASIC STRENGTH of American economy, in peace or in war, rests on the firm foundation of high production efficiency. As long as that foundation is in top condition, we have the right answer to an aggressor nation.

Our world leadership in production is largely dependent on the continuous development and unhampered utilization of machine tools. In the interests of national security, our shops and factories must be equipped with the most modern types of production equipment. Obviously, anything which interferes with the maintenance of high production efficiency, undermines our strength. Yet, while the ordinance department gives recognition to machine tool equipment, our Internal Revenue Department persists in following a rigid and arbitrary long-term depreciation policy that is a stumbling block in the path to national security.

American plants, hampered by this policy, cannot afford to install a program of continued machine tool replacement. Under present depreciation regulations, the cost of such a program must be carried year after year, without regard to business conditions or the rapidity with which a machine tool pays for itself.

Treasury officials insist that some machines may not be written off for some 20 years. Truly, that machine may not be worn out in that time, but it can be, and often is, made obsolete by new technical development in much less time.

Liberalization of machine tool depreciation policy, enabling manufacturers to install the machines they really need, would have a salutary effect on our economy. New machine tools are safer, faster, more efficient and occupy less space. Full utilization of their advantages would be a

mighty weapon in the fight against inflation and would help offset higher wage costs.

The prevailing depreciation policy is largely responsible for today's low level of the machine tool business and its corresponding minimum employment. Should a fighting war replace the cold war, and overnight hundreds of "ghost orders" turn to urgent production requirements, the machine tool industry will have to pull itself from low to high gear, literally by its own bootstraps.

Today's situation is not comparable to the pre-World War II days when industry was functioning at high level under the stimulus of foreign demands. If we are to be ready to meet emergency military requirements, it is imperative that the machine tool depreciation policy be relaxed so that manufacturers can arm themselves with the newest and best weapons for a war based on production.

As tool engineers, realizing full-well the role of machine tools in industry and recognizing their importance to national security, we should do all that we can to educate our business and governmental leaders to the necessity of liberalized machine tool depreciation policies.

The Treasury Department's depreciation policy is a relic of a horse and buggy age and is not compatible with an era of jet propulsion and atomic energy. We must urge a "free" depreciation policy under which the rates can be set by Treasury officials in consultation with machine tool purchasers. In this way, the Government can be protected against tax losses and industry will be freed to improve and expand.

When this shall come to pass, we will be on the road to the highest production efficiency in history.

*I. F. Holland*

*President 1948-49*

Dec., 1948

Vol. XXI, No. 6

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**THEY MAY  
LOOK ALIKE . . .**

*but there's a difference!*



Both gowns look alike to the camera's eye, but one is an original creation . . . the other a clever copy. By actual comparison a vast difference in quality and value is evident to the expert.

**THERE IS A DIFFERENCE IN TAPS, TOO!**

They may look alike at first glance, but the careful workmanship in BATH ground thread taps is easily detected by the experienced craftsman. Vital manufacturing intangibles too — such as quality control and pride in the product — consistently maintain this high Bath standard. Right from the start BATH stock and special taps are planned for uniformity and accuracy — they're ground from the solid AFTER hardening.

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You'll find BATH commercial and precision taps for any regular job and experienced BATH engineers to help you with unusual threading problems. Insist on BATH taps. Profit by their plus-performance!

PLUG AND RING THREAD GAGES

GROUND THREAD TAPS

• INTERNAL MICROMETERS

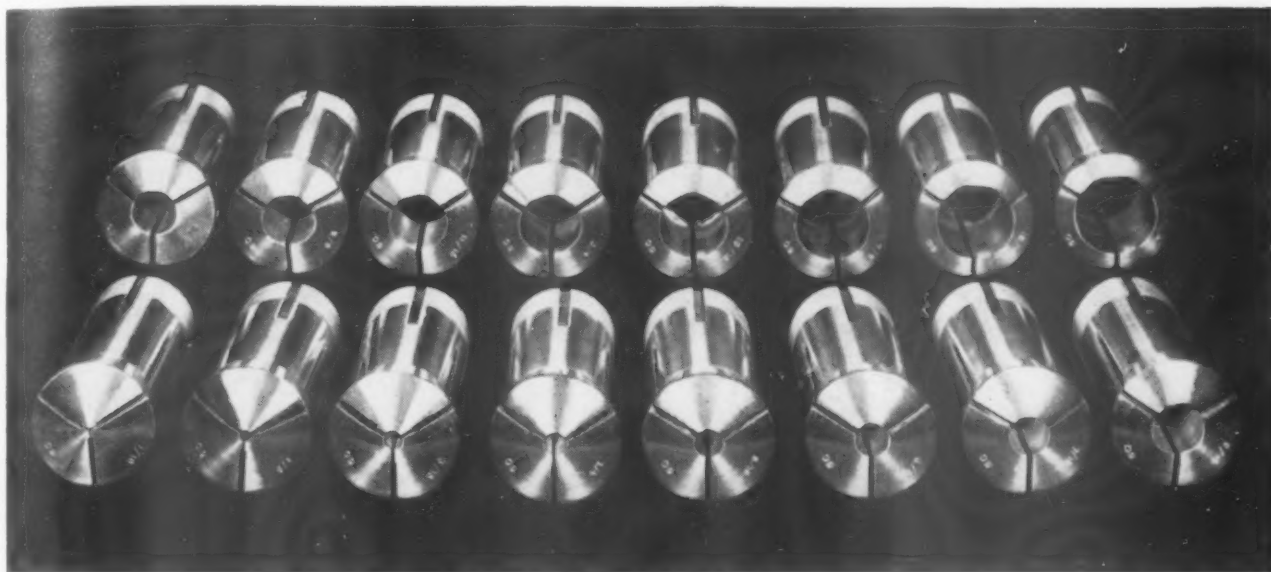
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ELMIRA, N.Y.

and get all 3\*



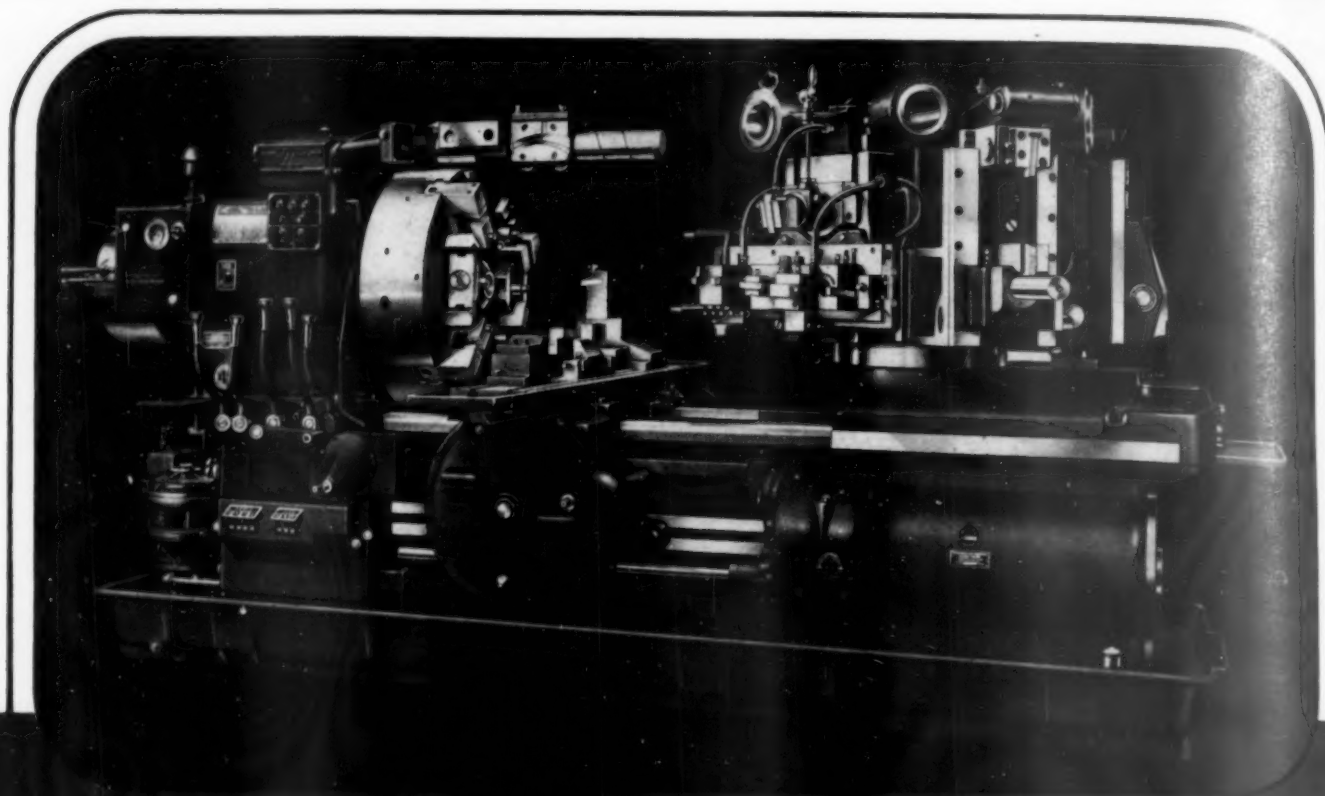
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- 3. Long Life

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When ordering collets only, or when ordering collets with lathes or milling machines of any make or size — specify HARDINGE Collets . . . they cost no more than other Collets. If you do not have the HARDINGE Bulletin No. 48 giving full details, write for your copy today.

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"PERFORMANCE HAS ESTABLISHED LEADERSHIP FOR HARDINGE"



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**the P. & J. automatic turret lathe designed for production of work requiring greater capacity . . . .**

In cases where existing units are not equipped to produce work requiring greater capacity, POTTER & JOHNSTON'S 8-DT AUTOMATIC TURRET LATHE is the natural solution. Like all P. & J. automatic turret lathes, the 8-DT produces carefully machined work in a hurry. Some of the reasons explaining its efficiency are: power, extreme rigidity, four changes of spindle speed, three selective automatic changes of feed, automatic binding of the turret following index, direct cross slide action, electro-pneumatic clutch operation, and a constant motor driven high speed motion to the cross slide and turret slide. It has twenty changes of speed between 7 and 160 rpm., arranged in five sets of four automatic changes. Feeds vary directly with the spindle

speed; coarse, medium or fine feeds may be selected from a choice of 24. The 8-DT is built to show a profit for companies that install them. Complete information will be sent promptly on request.

## SPECIFICATIONS

	8 DT	8 DXT
BED swing over	36"	36"
CROSS SLIDE swing over travel each way	23" 6 1/4"	23" 6 1/4"
TURRET No. of faces slide travel	6 31 1/2"	6 31 1/2"
		Extended bed model — increased cross slide adjustment.

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Division Milsco — Remont — Ford Company



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**"S-M" MOLYBDENUM** for hand sawing and for light and heavy power sawing, these blades are of special temper for high speed cutting and for hard metals. They have a remarkable record of performance and low cost per cut.



**HIGH SPEED STEEL** 18-4-1 Tungsten all hard blades for light and heavy power sawing to assure fast production on high alloy metals, stainless steel, phosphor bronze, tool steels, chrome steel, Monel metal and the like.



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**STANDARD** Flexible Back, All Hard and "Semi-Flex" in the right size and teeth per inch for hand sawing jobs of all sorts. Fast cutting, long lived, thoroughly reliable.

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AND BAND SAWS • PRECISION GROUND FLAT STOCK  
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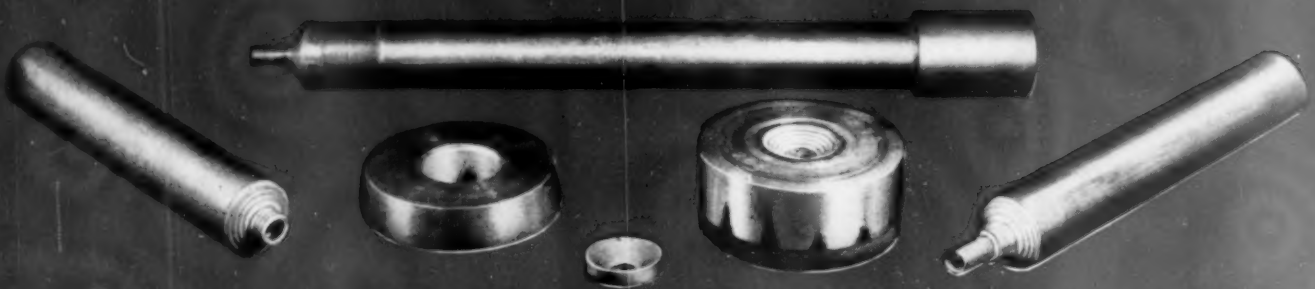
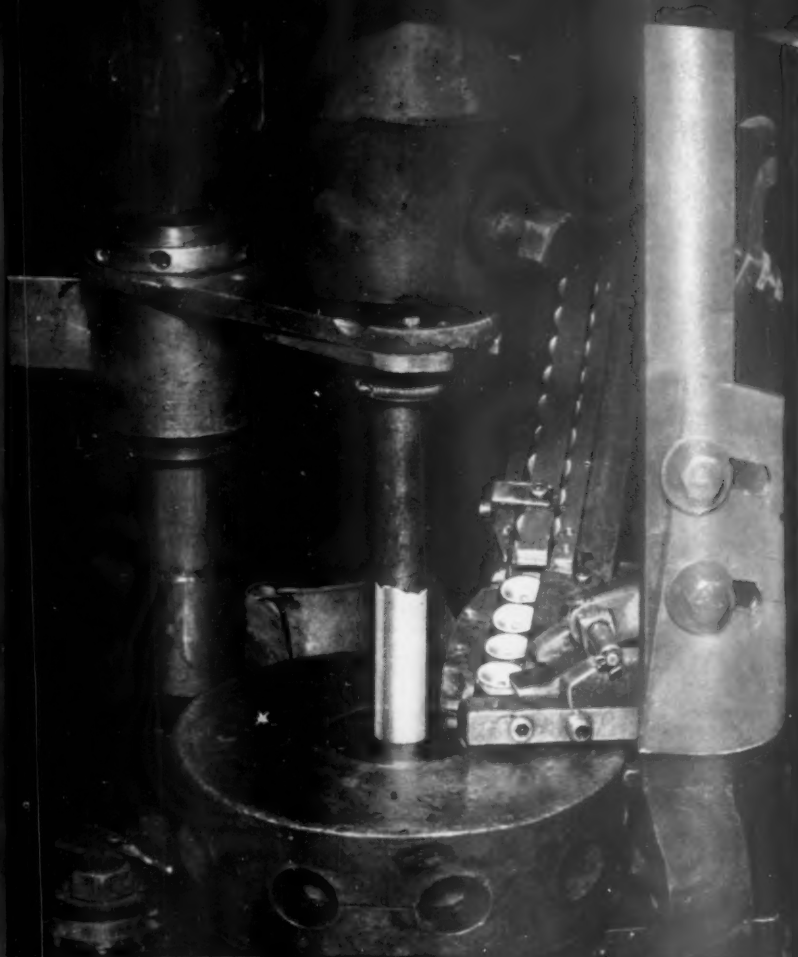
THE L. S. STARRETT CO. • *World's Greatest Toolmakers* • ATHOL, MASSACHUSETTS, U. S. A.

# Impact Extrusion

with

## BETHLEHEM TOOL STEELS

Extruding toothpaste tubes at Victor Industries with Bethlehem tool steel. The lubricated slugs are subjected to pressures from 50 to 300 tons in this extrusion press. As the punch is driven downward on the slug resting in the die, the aluminum flows up the punch to form the tube shape.



At left is shown the finished aluminum tube with the end threaded for a cap. The punch is at the top; below it are the upper and lower dies with the aluminum slug between them. At the right is shown the tube before the tip is cut off.

Dependable tool steel is essential for impact extrusion jobs. Victor Industries Corp. of California at Chico, Calif., uses Bethlehem tool steels exclusively and reports fine performance. This plant is the first of its kind to go into production on the West Coast, converting aluminum slugs into squeezable tubes for toothpaste, shaving cream, glue, grease, and other items.

The dies are machined to accurate contour from Bethlehem XX Carbon Tool Steel. This is a general-purpose, water-hardening grade that provides a hard surface for wear-resistance, reinforced by a tough core to withstand the continuous heavy pounding and side pressure exerted on the dies.

The punches are made from Lehigh H, a high-carbon, high-chromium grade that is air-hardening for maximum safety in quenching. In addition, it provides

the minimum of distortion during heat-treatment and has extremely high wear resistance.

These and other fine Bethlehem tool steels are carefully made in our modern tool steel mill. There are tool and die grades, shock steels, hot-work and high-speed steels. You can get prompt shipment and practical assistance by consulting with the nearest Bethlehem sales office or tool steel distributor.

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are sold by  
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### BETHLEHEM TOOL STEELS for EVERY JOB

# NORBIDE Dressing Stick

*for the  
Tool  
Room*



**Small . . .**

**Lightweight . . .**

**Convenient . . . Wear-resistant**

Because they are the hardest dressing sticks made, NORBIDE\* sticks dress tool wheels quickly, efficiently—and have extremely long service life. Small ( $3/16 \times 1/2 \times 3''$ ), lightweight and easy to use, NORBIDE dressing sticks are perfect for tool wheels 10" and smaller, especially cup and saucer shapes. They are low heat conductors and therefore will not burn the hand.

NORBIDE dressing sticks were first introduced to the trade two years ago. Such long service have they given that the original sticks are still being used in many plants. NORBIDE dressing sticks are molded, without bond, from Norton Boron Carbide—"the hardest material made by man". For further information write to.

**NORTON COMPANY**

**WORCESTER 6, MASS.**

\* Reg. Trade-mark

## Standardizing Cuts Ring Gage Inventory

ANDERSON, IND. By standardizing on the *Sturdy* tungsten carbide ring gages shown below, an Indiana auto parts maker now profits from a three-way savings. Since his *Sturdy* gages outwear previous steel types 100 to one, gage inventory no longer is extensive. The number of good parts rejected by excessive wear allowance has been reduced, likewise, the number of bad parts passed by excessive gage wear has been cut down. Now, day in and day out, his finished products meet specifications accurately at minimum gage expense, thanks to *Sturdy*. ↓



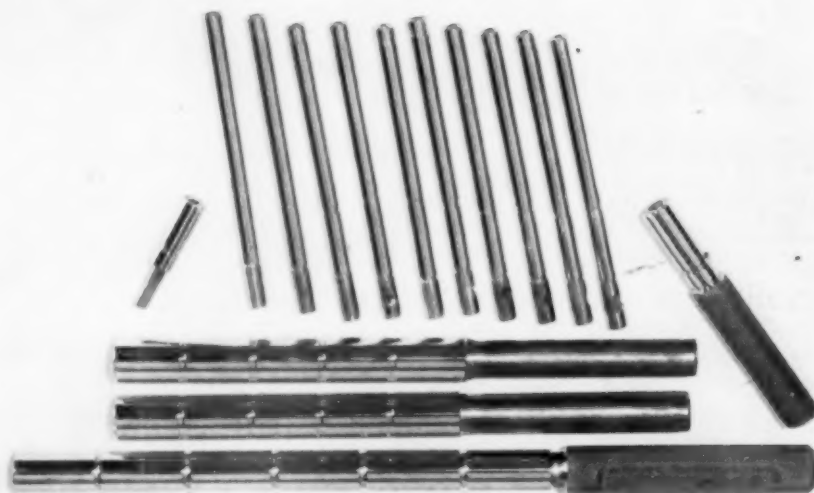
STURDY TOOL & GAGE COMPANY  
LAPPER ADAPTERS  
30 NORBIDE INSERTED GEAR  
LAPPER ADAPTERS

## Closest Approach to Perfect Bushings Now in Use by Midwest Auto Maker

Detroit, Mich. Shown above, ready for shipping, are thirty-seven unique bushings for gear lapper adaptors. Equipped with two Norbide \*bearings, these bush-

ings hold the rear axle drive for lapping with the mating ring gear, an operation demanding undeviating accuracy. Engineered to the specifications of one of the largest automobile manufacturers by *The Sturdy Tool and Gage Company*, pioneers in working with Norbide, these bushings have greatly improved the quality of the completed rear axle as well as cutting production costs. Whereas bushings made of tool steel lasted approximately two weeks, these *Sturdy* bushings inserted with Norbide, are lasting 12 to 14 months!

\* T.M. THE NORTON CO.



↑ The above order of re-plated gages is for one manufacturer. Like others, within a surprisingly large radius of Detroit, he has found *Sturdy* offers extremely short delivery on salvaging old, worn out gages by chrome plate. The unusually brilliant finish of less than one micro inch given to *Sturdy* salvaged gages is easily noticeable in the photograph. Factwise, these gages will outwear steel gages five to one!



↑ Cleveland, Ohio. When a prominent Cleveland aircraft pump manufacturer required absolute accuracy, *STURDY* was selected to make the rotor checking gage with 12" long cylinder O.D. to  $\pm .000003$ . ( $\pm$  Three Millionths).

Advertisement of

**STURDY TOOL and GAGE COMPANY, DETROIT**

14520 Schaefer

Phone: Vermont 7-1400

**STURDY**

Millionths or Thousandths . . .  
According to Your Needs!

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**TO OBTAIN THE LONGEST WEARING GAGE**  
**Request a NORBIDE Gage**  
**then DOUBLE gage life again**  
**by making it REVERSIBLE.**

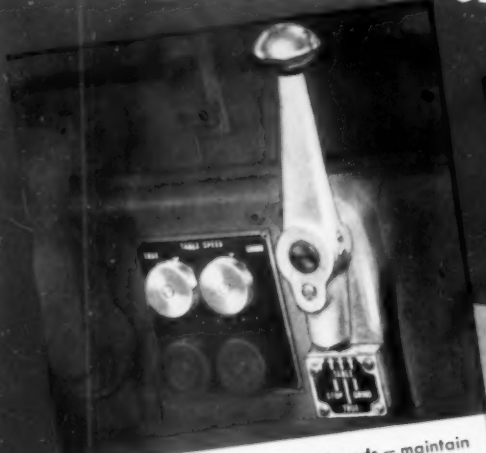


NORBIDE plug gages, along with many other types of NORBIDE gages, have long been known to gage users for their exceptionally long-wearing qualities. NORBIDE gages are made of Norton Boron Carbide which is the hardest material made by man. Gage life has often been increased up to one hundred times by the use of NORBIDE members in the gages.

Some gage suppliers are further doubling plug gage life by producing reversible gages. As one end of either the "go" or "no go" member becomes worn, it may be removed from the handle and reversed with the unworn end thus being made available for further long gage life. Your regular gage supplier should be able to provide NORBIDE gages or, for further information, we invite your inquiries.

**NORTON COMPANY, WORCESTER 6, MASS.**

# More about the cost-saving features



**Pre-set Truing and Grinding Speeds**—maintain separate table speeds for truing and for grinding—immediate selection by this lever.



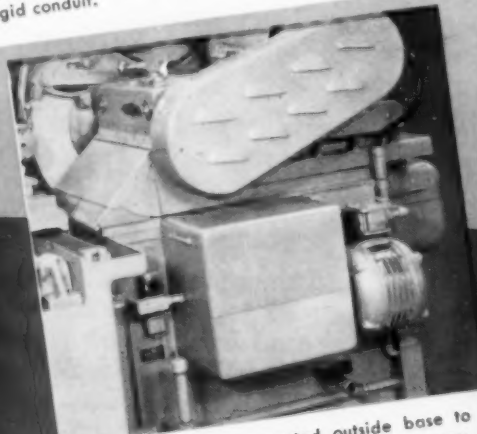
**Work Jogging** with this fingertip lever, work may be jogged at any time—whether work rotation is being automatically or manually governed.



**Electrical equipment** servicing made easy. Major controls located in elevated, accessible cabinet. Note rigid conduit.



**Hinged guard** for rapid wheel change—ramped outlet to coolant tank for easy sludge removal.



**Pumps and motors** mounted outside base to insure convenience and minimum time consumption in maintenance and service.



**Steel ribbon type guards** provide complete protection of base ways and require no extra floor space.

Abrasives · Grinding Wheels · Grinding and Lapping Machines · Refractories · Porous Mediums · Non-slip Floors · Norbide Products · Labeling Machines

# *of the* **NORTON TYPE CTU CYLINDRICAL GRINDERS**

NORTON grinding machines are designed not only for precision and dependability—they're designed with cost-cutting operating and maintenance features! For instance, the new Type CTU machines provide:

**For reduction of operating costs:**

1. Pre-set Truing and Grinding Speed Control
2. Work Jogging Control
3. Automatic Controls
  - (a) Automatic wheel feed at table reversals
  - (b) Automatic re-set after grinding to size
  - (c) Automatic Work Start-Stop
  - (d) Automatic Coolant Control

**For reduction of maintenance costs:**

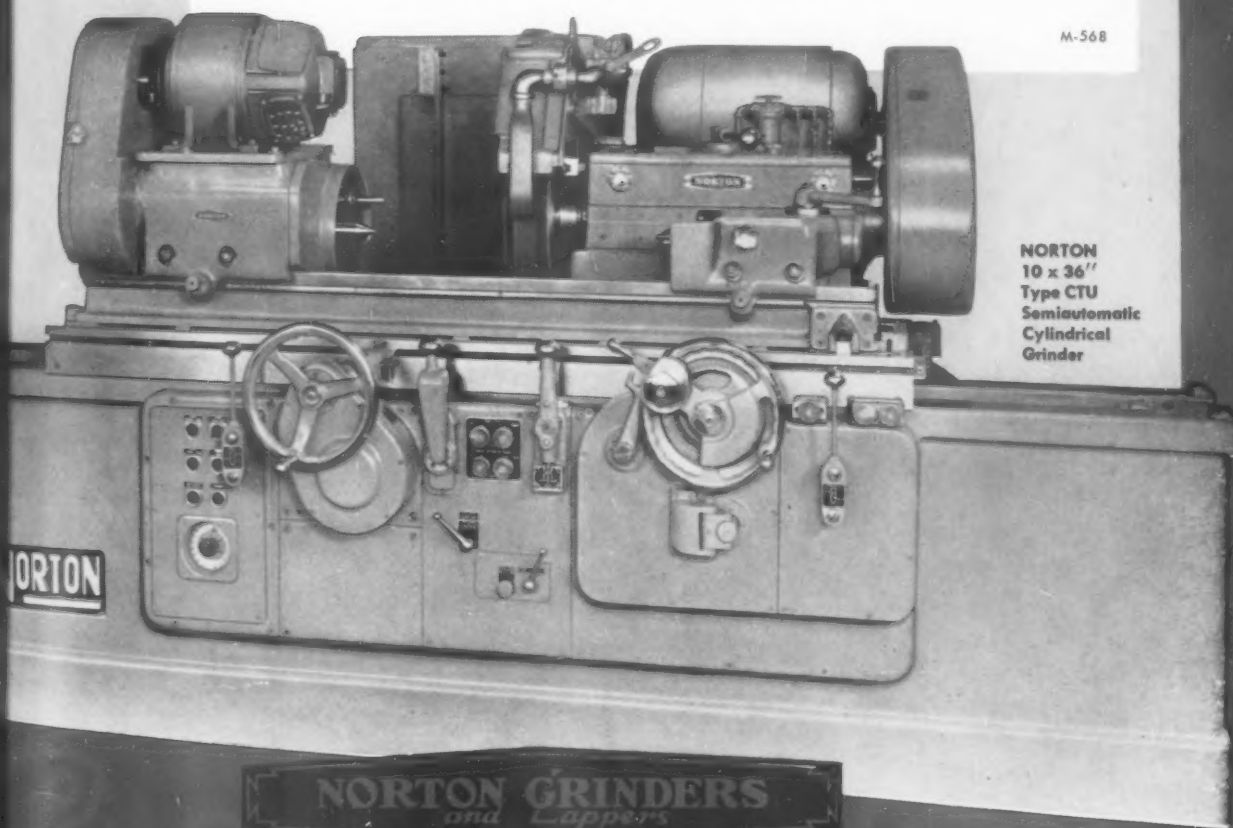
1. Grouping of electrical controls
2. Hinged-type wheel guard
3. Coolant clean-out ramp
4. Pump mountings outside base
5. Ribbon-type base way guards

Such features mean real savings. They reduce the need for high operating skill—lessen effort—speed production—and greatly reduce "down time" for maintenance.

Write for catalogs—no obligation of course.

M-568

**NORTON  
10 x 36"  
Type CTU  
Semiautomatic  
Cylindrical  
Grinder**



**NORTON GRINDERS**  
*and Lappers*

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How a textile machinery manufacturer

# INCREASED PRODUCTION 275%

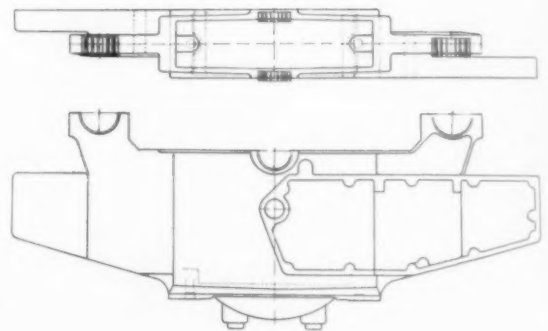
## with a new HEALD 321 Bore-Matic

Production of "gang frames" for textile machinery jumped from 30 parts to 113 parts per hour when this new Heald Bore-Matic went on the job. Now, four semi-circular bores in the zinc-die-cast part are finished automatically, with a single setting of the controls. The casting is precisely located from two dowel holes and the milled-off bottom surface, and is secured by manually-operated spring clamps. The machine then starts the automatic cycle — first rapid traversing the table to the left and boring the left-hand center bore. A jump cam then rapid traverses the table further to the left, for finishing the two end cuts and the right-hand center bore.

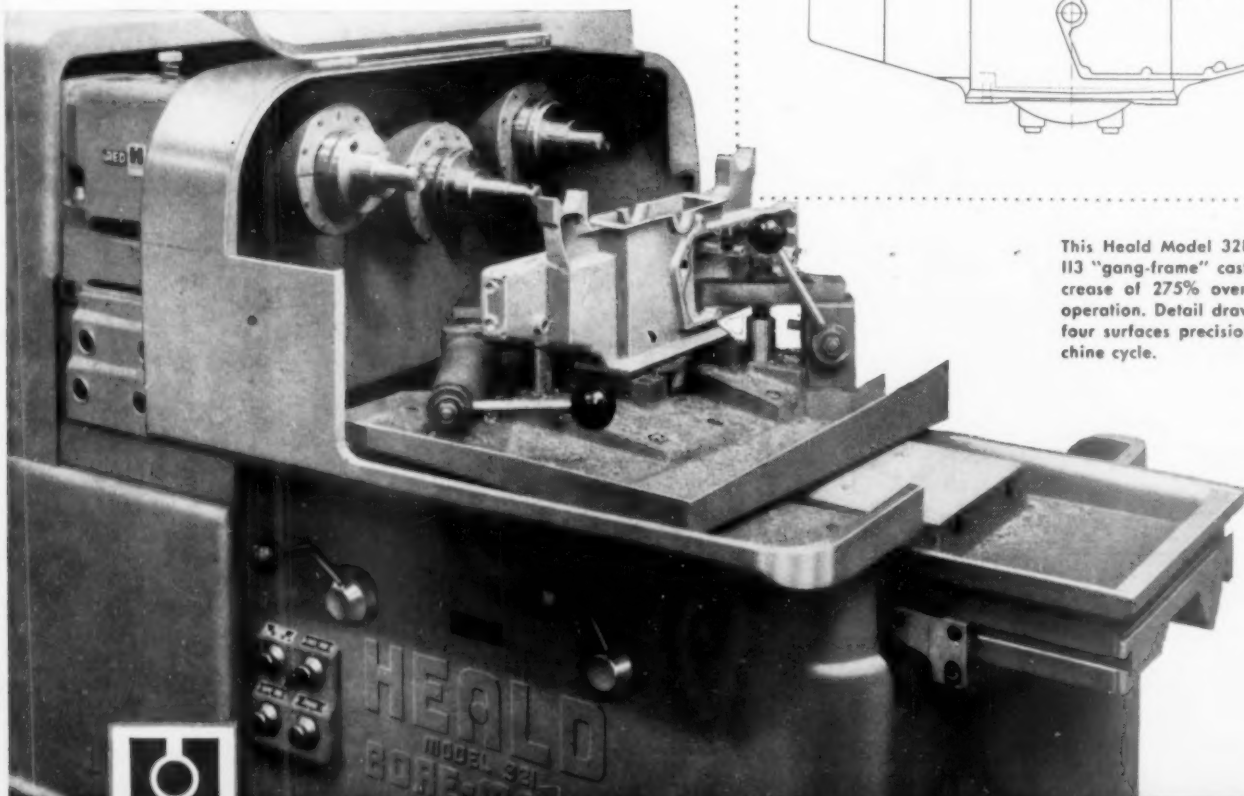
"Gang frames" may be a far cry from your precision finishing problem but the implication is obvious; faster, more efficient Heald Bore-Matics mean increased production and greater precision for you at lower costs.

### ... AND HERE'S WHY:

1. **FASTER CYCLE**—jump cam and extremely fast table traverse speed up machine operation.
2. **EASE OF OPERATION**—all holes bored automatically after clamping and throwing starting lever.
3. **GREATER ACCURACY**—smooth table operation and high-precision, cool-running heads eliminate scrap.
4. **CONSTANT FEEDS**—hydraulic feeds and speeds retain their settings regardless of temperature changes.
5. **MINIMUM MAINTENANCE**—automatic lubrication and accessible operating units greatly reduce maintenance costs.



This Heald Model 321 Bore-Matic turns out 113 "gang-frame" castings an hour—an increase of 275% over previous method of operation. Detail drawing above shows the four surfaces precision finished in one machine cycle.



**THE HEALD MACHINE COMPANY, Worcester 6, Mass.**

Branch Offices in Chicago • Cleveland • Dayton • Detroit • Indianapolis • Lansing • New York



# Announcing

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- Wide versatility
- One-piece welded construction
- Write for Catalog 84

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DISTRICT OFFICES: DETROIT • CLEVELAND • NEW YORK

**FOR ADVANCED DESIGN** *look into....*

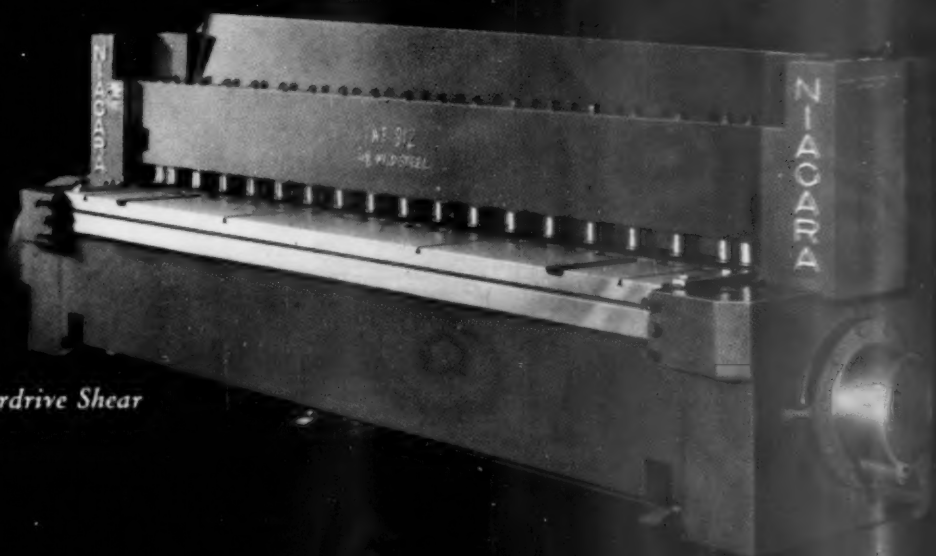
**NIAGA**



*Niagara Double Crank Press*



*Niagara Deep Throat Press*



*Niagara Underdrive Shear*

**NIAGARA MACHINE AND TOOL WORKS, BUFFALO 11, N. Y.**

# NIAGARA

● The modern design of Niagara Presses, Shears and other machines for plate and sheet metal work is proof of the Niagara talent and experience that is built into them. Men responsible for economical production appreciate these results of Niagara engineering,—high hourly output...convenient operation...accurate work...reliable, uninterrupted performance with minimum down time...low maintenance cost.

*Write for Bulletins*



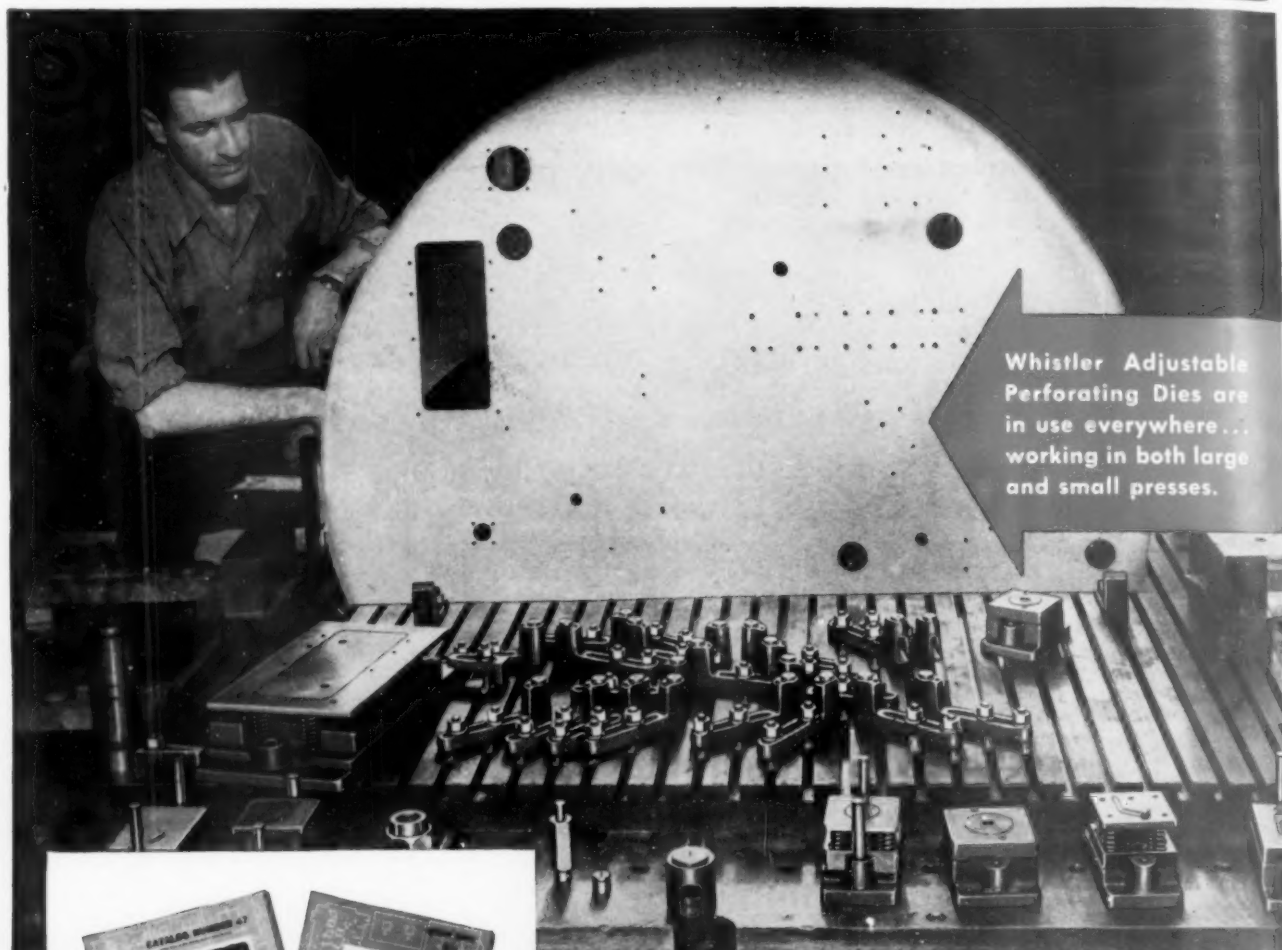
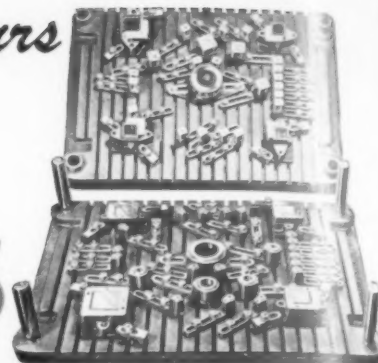
*Niagara Double Crank Gap Press*

*America's  
most complete  
line of*

**PRESSES,  
SHEARS,  
TINNERS  
TOOLS  
AND  
MACHINES  
FOR  
PLATE AND  
SHEET METAL  
WORK**



*Get into Production in a few hours  
with* **WHISTLER  
ADJUSTABLE DIES**



Whistler Adjustable  
Perforating Dies are  
in use everywhere...  
working in both large  
and small presses.



There are plenty of other advantages in using Whistler Adjustable Dies. It makes sense to get the complete story. And it's easy to do. Write for your Whistler Catalogs today.

Whistler perforating dies now offer a double-barreled advantage in getting into production faster. Standard sizes of round hole punches and dies...  $\frac{1}{32}$  to 3"... can be shipped promptly. Special shapes... squares, ovals, rectangles, group and notching dies, are quickly made to order.

Equally important, set-ups are simple... take only a short time. Same units can be rearranged or units added in setting up different jobs. Production is thus speeded while die costs are amortized through continued re-use.

No special tools are needed. All parts are interchangeable. The heavy duty series of punches and dies easily pierce materials up to  $\frac{1}{4}$ " mild steel.

**S. B. WHISTLER & SONS, Inc.**

744 MILITARY ROAD, BUFFALO 17, NEW YORK



# East Meets West at Los Angeles Convention

## A.S.T.E. Sees Century of Development on the Pacific

**O**N THE centennial of the opening of the West, ASTE took time out for a look at the great industrial machine that has been developed beyond the Rockies. With their families and friends, members from Montreal, Boston, Houston, Portland, Ore., and 36 chapters in between, gathered at Los Angeles, October 11-13, for the Society's 16th semi-annual meeting.

Nearly half of the 300 participating were from the host chapter. Detroit, Golden Gate and Milwaukee sent the largest delegations. Of the visitors, 65 took advantage of the special train trip from Chicago, arranged by the Society. From the time the streamliner pulled in, their hosts were on hand to greet them, escort them to convention headquarters at Hotel Biltmore, and show off the big, sprawling town.

As set up by the National Program Committee, the schedule was planned to give visitors full benefit of the mild California outdoors during sunlight hours. Plant tours and sightseeing filled the three days. Evening events were limited to the technical sessions and banquet.

Steel production attracted two busloads of convention registrants to the giant Kaiser Co. mills at Fontana, located about 50 miles from Los Angeles near iron ore and coal deposits. As they started the tour, a spectacular sight greeted the visitors. Glowing from its 20-hour distillation at 2100 deg F., a nine-ton "coke push" emerged from the ovens, shoved by a large "ram" into a waiting rail car. Gas from the coke plant helps supply heat to the blast furnaces, and also to the open hearths, which refine iron into steel ingots.

From here the trip led to the stripper plant where ingots are removed from the molds, then plunged into soaking pits and reheated to a uniform temperature. Next stop was the

From top: 1. At the banquet reception this trio of prexies compare notes on industry in the East and West. They are, from left: W. B. Peirce of Pittsburgh, immediate past president of ASTE; K. T. Norris (guest speaker), president, Norris Stamping and Mfg. Co., Los Angeles; and I. F. Holland of Hartford, incumbent Society head. 2. J. E. Ekstromer, Jr., chairman of registration and reservations, and his staff keep busy registering visitors and answering questions. 3. The crowd begins to gather for the all-day Hollywood bus trip. 4. Singing "We're marching along, we're the Tool Engineers," this group from the special train party presents the premiere of the ASTE Marching Song composed en route to the Coast. From left: Sarah Swan of Elmira, only woman member at the convention; ("Petie") Mrs. R. W. Ford of Pittsburgh, Gardner Young, former Pittsburgh chairman; Mrs. Roger Waindle of Aurora, Ill.; and Mrs. I. F. Holland of Hartford, Conn. In the background Toastmaster Edward Arnold, film and radio actor, gives the performers a big hand.





## Trips to Plants . . .

blooming mill, to see ingots reduced to billets for processing in the various rolling mills. The structural mill and merchant mill were down for repair and the new 85,000,000 pipe mill is not yet open for inspection. But company guides explained operations there in exact detail.

Those acquainted with steel mills were impressed with the cleanliness of the Kaiser buildings and grounds. The plant has every modern facility for safety and for utilizing all by-products. At the conclusion of the tour, the Kaiser management entertained the group at luncheon.

Returning to Los Angeles there was a stop at Mission San Gabriel, considered the best preserved of those founded along El Camino Real by the Spanish padres. Once a sleepy Mexican village older than Los Angeles itself, the town of San Gabriel now bustles with a population of 20,000 and a rapidly growing industrial section.

On another day-long tour, part of the convention crowd saw how some 20 carloads of automobile parts, received daily at the Los Angeles Lincoln-Mercury assembly plant, are converted into sub-assemblies and finally become shiny, new motor cars. Even those already familiar with automotive production showed keen interest in the modern, labor-saving and health-promoting features of the new plant.

To round out the day the party drove around the Long Beach-Los Angeles Harbor, base for the Navy's Pacific fleet and shelter for world shipping. Some concept of California's biggest industry was gained at Signal Hill, one of the world's most productive oil fields.

### Alertness of Visitors Commended

Other groups chose trips to U. S. Electrical Motors, Inc., Firestone Tire & Rubber Co., American Can Co., and U. S. Steel Products Co. At all of the plants visited, company officials commented on the unusual interest and attentiveness of the engineers.

Wednesday, while most of the out-of-towners were doing Hollywood, a number of local members learned how glass is made, in an Owens-Illinois branch plant. This tour included the batch house, furnace line, forming department, mold repair, quality and specifications, selecting, warehouse, and decorating departments.

Meanwhile three busloads of delegates were going out Wilshire Boulevard, through the swank shopping district to Hollywood, Beverly Hills and other fine suburbs. As the motor coaches wound in and out of picturesque lanes and pretentious avenues, the drivers pointed out homes of movie celebrities and other prominent residents.

From top: 1. Three members step up for a closer look at a chassis as it moves along final assembly line at Los Angeles Lincoln-Mercury assembly plant. From left: Carroll L. Morse and Rudolph V. Larson, Worcester, Mass.; and John L. Salzer, Houston, Texas. 2. On the Warner Bros. "plant" tour ASTE members saw movies being tooled up in this machine shop. 3. A group visiting the Kaiser steel mills at Fontana arrives just in time to see this glowing, nine-ton "coke push" ejected into a rail car. 4. The engineers watch assembly of steering columns at Ford's local Lincoln-Mercury plant. Next page, left: National Director and Mrs. H. E. Collins of Houston study cement footprints of Hollywood immortals, impressed in paving of Grauman's Chinese Theatre. Cass Dombrowski (hand in pocket) of Detroit, Mich., listens to guide's lecture. Right column, from top: 1. This party leaves the old San Gabriel Mission, returning from the Kaiser tour. 2. Like a ghost town are these deserted streets of Warner Bros. movie sets, viewed from a sightseeing bus. At right is side view of what appears from the front as a substantial frame house. 3. Forge rolling holds the attention of a party visiting Boyle Manufacturing Division of United States Steel Products Co. From left: Henry C. Behm, Detroit, Mich.; Henry T. Needham, Kansas City, Mo.; Paul Plummer, Downey, Calif.; Anton Greenfield and William E. Winney, Los Angeles; and Frank Pinson, Emeryville, Calif. 4. Dwarfed by the magnitude of Hollywood Bowl, ASTE sightseers gaze at the big shell from which starlight symphonies float out over the great natural amphitheatre.

## Hollywood, too . . .

At Hollywood Bowl everybody got out for a closeup of the big shell where starlight concerts are given. Then on to Grauman's Chinese Theatre for a look-see at signatures, footprints and other marks of film idols, in the paving.

Although the movie industry looks down its nose at visitors, the gates of Warner Bros. big "plant" in Burbank opened to the tool engineers. But only after guards were satisfied that both drivers and passengers were meeting all company regulations. Around administration buildings, dressing rooms and sound stages, little activity was visible. Those who looked quickly enough caught a glimpse of Alan Hale and Sidney Greenstreet. Along deserted streets of marble, brick, stone and frame building and house facades—all simulated in paper—the crowd recognized settings for former film fare.

### Machine Shop Tools Up Movies

Then on past pocket handkerchief "parks"; tanks where naval engagements are staged—in miniature; open warehouses stuffed with an incredible conglomeration of stage props; and building trades shops. Eyes really bugged out, though, as the buses rolled slowly by the open doors of a businesslike machine shop.

Westward at Santa Monica, many had their first glimpse of the Pacific, from a bluff overlooking the beach. Climax of the trip was lunch at the Farmer's Market. Here everyone shopped the open-air stalls for appetizing dishes, then consumed them leisurely at umbrella shaded tables.

Wives of Los Angeles members took the out-of-town ladies under their wing. Small groups in private pleasure cars did points of interest and, of course, the shops. Some took the opportunity to see broadcasts of favorite soap operas.

In a lounge reserved for convention guests, host committeemen held open house throughout the meeting. They helped man the registration desk, handled plant tour, banquet and hotel reservations; and assisted wherever possible in making visitors feel at home.

L. F. Hawes, Los Angeles chapter chairman, headed the committee, assisted by: J. E. Ekstromer, Jr., reservations and registration; Anton Peck, plant tours; R. G. Stronks, technical program; M. W. Seavey, banquet and session arrangements; Rudolf Regen, publicity; Wayne Ewing, transportation; A. D. Lewis, reception; H. A. Miller, tickets; R. H. Kollenborn, emergency; H. S. Bamberger, signs; Carl Wight, records and reports; J. A. Parks and R. R. Lynch, entertainment; Rudolph Powroznik, budget; and G. J. Walkey, supplementary activities.





## Technical Talks . . .

Present knowledge of jet and rocket propulsion and aerodynamics is adequate to build a rocket that will soar to the moon or revolve forever about the earth. But no way has yet been discovered to get such a device back to the earth.

With this and other scientific revelations verging on fantasy, Hall Hibbard, vice-president and chief engineer, Lockheed Aircraft Corp., Burbank, held the first technical session audience spellbound.

Such a rocket, he explained, can be powered by five motors fueled with liquid oxygen and hydrogen. Thrust developed at take-off is about 500,000 lb. Each motor runs successively for 30 seconds, burns itself out of fuel, dies, disengages itself and drops away. By the time the fifth unit has exhausted itself, the vehicle has left the atmosphere and is traveling through space. It is moving 25,500 mph at an altitude of 700 miles with no resistance of any kind.

En route its passenger in a pressurized cabin has passed many air marks. The 18,050 foot level above which no human can live; the 21,000 foot point where lack of oxygen extinguishes a match. Greatest height reached by an unmanned weather balloon is left behind at 132,000 feet. At 352,000 the space traveler passes the limits attained by the German C-2 rocket. Beyond 400,000 feet there is no longer sound. Higher than 450,000 it is pitch dark, except in the direction of the sun. There is no atmosphere to diffuse and spread the light. The adventurer is free in space.

Entering the realm of conjecture, Mr. Hibbard described sensations to be experienced by a traveler in a space ship and optional destinations he might choose. In the first experiments the five-step rocket will probably be directed to circle the earth outside of the atmosphere. There it may be observed by telescope as it whirls endlessly in its orbit. Although it would mean slow death to accompany the rocket, science anticipates no dearth of volunteers. Many would be willing to take the one-way adventure, to radio their experiences back to the earth.

Answering questions from the floor, Mr. Hibbard asserted



that jet propelled transatlantic passenger airliners can be built within six years. And they will be 30 per cent cheaper to operate than present planes.

He made it clear that a jet plane gets its thrust from the explosive force against the front of the engine, not by the jet pushing on the air behind it. Jet engines use kerosene or gasoline mixed with air. Rocket motors require liquid oxygen and hydrogen under high temperatures. Slides augmented Mr. Hibbard's lay presentation of a highly scientific subject.

A symposium, "Petroleum Industry—Tooling and Refining," was presented Tuesday evening by six representatives of the oil industry. Earl Noble, manager of exploration, Union Oil Co., Los Angeles, discussed techniques used in searching for oil, most favorable geological formations, and geophysical instruments employed in exploration. At the rate oil is being used, Mr. Noble warned, some two billion barrels of new oil must be located each year.

"Modern Tools and Equipment for Drilling 20,000-Foot Wells," from drill collars to drawworks, were described by Spencer W. Long, assistant chief engineer, National Supply Co., Torrance, Calif. Operation of a drilling rig, cable and rotary bit drilling methods, and types of power plants used in oil fields were emphasized.

### Oil Industry Needs More Tooling Ingenuity

Problems in whipstocking, a method of deflecting well bores to reach offshore locations, featured the address of Gordon Jackson, vice-president and general manager, Eastman Oil Well Survey Co., Denver, Colo. Other applications of this technique, he stated, are used in drilling for lost or broken tools and to smother ignited wells.

Since the introduction of oil well cementing, petroleum production has increased immeasurably, W. G. Owsley, chief technical advisor, Halliburton Oil Well Cementing Co., Duncan, Okla., told the engineers. By pumping a cement slurry down through the casing and up between casing and bore wall, the bore becomes a permanent steel tube. This seals off unwanted fluids and prevents blowouts from shallow formations above the producing location.

Varying laws governing weight limits for mobile equipment pose a problem in building pumps. They must be as light in weight as is consistent with the high strength required to withstand steam pressures often in excess of 10,000 lb. psi. Aluminum and magnesium alloy parts are being used where practical, but the demand for greater pressures increases.

O. N. Miller, general manager of manufacturing, Standard Oil Co. of California, San Francisco, appealed for more tool engineering ingenuity in simplifying and standardizing the design of refinery equipment. New and better alloys must be developed to reduce the size and extend the operating life of pumps, turbines and other precision machinery. New special tools, he added, are needed for performing maintenance operations in the field with a minimum of labor.

One of the industry's most important activities is oil field standardization, according to John Hills, staff engineer, General Petroleum Corp., Los Angeles. Throughout the

Top: Society officers meet with the petroleum session speakers. Standing from left: Leslie F. Hawes and Richard R. Linch of Los Angeles chapter; Spencer W. Long and Edward W. Baumgardner, program chairman. Seated: Gordon Jackson, John Hills, Earl Noble and guest, and Arthur D. Lewis, session chairman. Below, left: Hall L. Hibbard (left) receives certificate of appreciation for outstanding address, "Adventures in Space," from Fred J. Schmitt, session chairman. Right: William G. Owsley discussing cementing of oil wells while O. N. Miller, another speaker, looks on.



world, he said, American Petroleum Institute standards are known and used. Besides promoting interchangeability of equipment, they achieve economy, uniform nomenclature, and maximum utility in products made for the industry.

Slides shown by the speakers illustrated technical points. An exhibit of survey tools was displayed after the session.

Chairman for the meeting was Arthur D. Lewis of Art Lewis Production Equipment Co., Glendale, Calif. Fred J. Schmitt, director of sales, D. A. Stuart Oil Co., Chicago, presided at the previous session. The entire program was presented under the direction of E. W. Baumgardner of Cleveland, national program chairman.

## Banquet Festivities . . .

Wind-up of the three busy days was a social get-together at the banquet in the Biltmore ballroom, Wednesday evening. A heady fragrance from the flower-strewn tables and the smooth music of a local name band set the mood for the evening. Serving in the role of toastmaster, genial Edward Arnold, motion picture and radio actor, gave the affair a Hollywood touch.

Admiration for the Pacific coast's industrial achievements grew as Kenneth T. Norris, president of Norris Stamping and Manufacturing Co., Los Angeles, frankly stated the area's problems, in an after dinner address.

Extension of local steel production facilities capable of meeting eastern competition is western industry's most urgent need, if it is to continue meeting an increasing market for durable goods. Cheap intercoastal shipping has been discontinued with a resulting loss of competition between railroads and steamships. This forces the western manufacturer to pay an additional premium on imported material.

Some steel is now produced locally at costs comparable to eastern metal. In fact eastern fabricators are buying from western mills, despite efforts to prevent diversion of the home product to distant domestic and export markets. Another headache is the acute shortage of fuel, water and power. Oil is used as fast as produced, so new fields must be found. To supplement existing gas supplies, additional pipelines have been authorized. And government engineers are studying how to bring the Colorado River to California, where to locate new hydro-electric plants.

Jobs have been found for former war workers, but each month 20,000 newcomers pour into the Los Angeles area alone. Industry must create more employment; agriculture can't take up the slack.

On the brighter side, Mr. Norris cited a \$23,000,000 investment in new west coast plants since V-J Day, the area's leadership in aircraft research and development, its wealth of engineering talent. When advantages offset disadvantages, the West can progress toward self-sufficiency. Whatever tool engineers can do to reduce production costs enhances that chance of success, he said.

Speaking as an "ambassador of good will without portfolio," Mr. Arnold gave sidelights on the motion picture industry's charitable activities, its wartime contributions in entertainment and war bond selling, and business problems.

I. F. Holland, ASTE president, spoke briefly concerning the significance of the Society's convention in the young industrial West, and of the organization's own achievement in the completion of a new headquarters building at Detroit. H. E. Conrad, executive secretary from the Detroit office, opened the meeting and introduced the toastmaster. Following the speaking program, a lively floor show was presented, and the evening concluded with dancing.

Visitors fortunate enough to share the ASTE special train trip from Chicago collected an extra dividend in three additional days of association with their fellow members. Traveling in four new sleeping cars, a lounge, and a diner assigned for their exclusive use, the party fell into an easy informality right from the start. As the train sped southwest, gaudy plaid shirts and comfortable slacks were donned. Activities centered in the lounge. There were continual contests at cribbage, checkers, bridge and other card games. One group composed an ASTE marching song and rehearsed it for its premiere at the banquet.

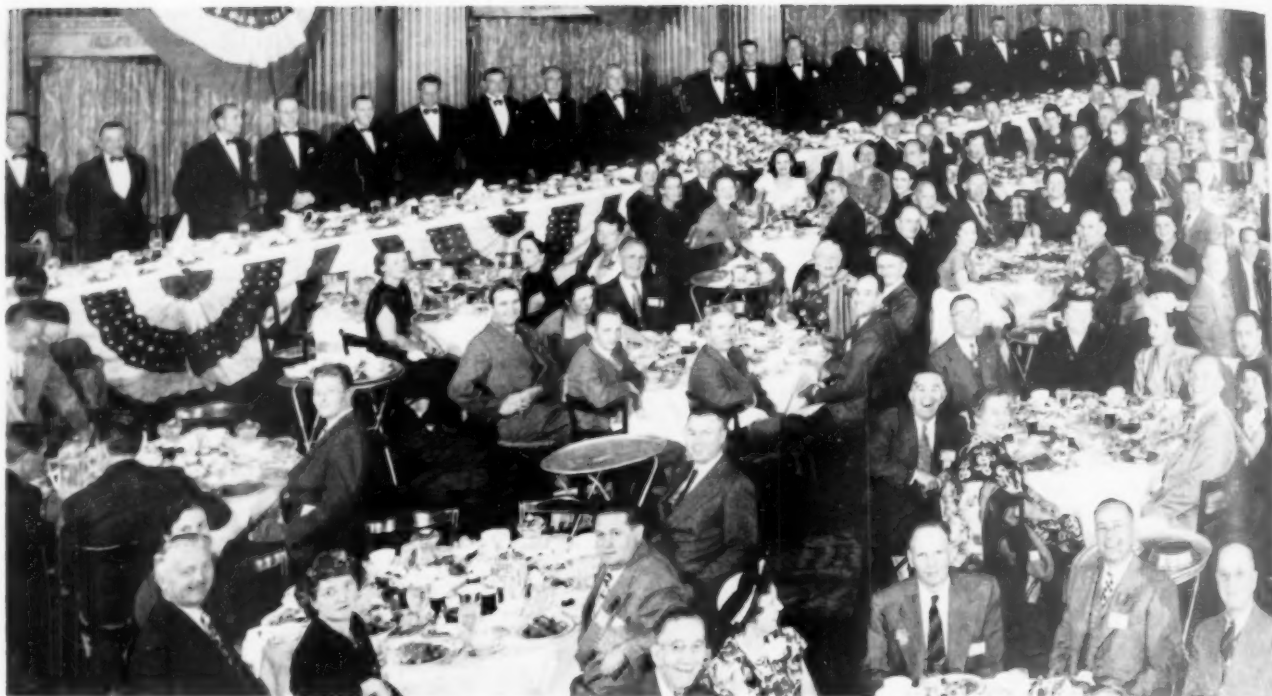
Many a tooling problem was apparently worked out as the miles flew by, judging from drawings on menu cards and tablecloths. At least one chapter officer is satisfied that taking his wife along has paid off. Mrs. Tool Engineer enjoyed herself so much that she is now more tolerant of the inroads of Society activities on her husband's time. (Ed.'s note: And the whole company was captivated by Mrs. T. E.'s charm.)

The day at Grand Canyon National Park in Arizona was an unforgettable experience for everyone. It dawned with the vivid blue sky and clear, invigorating air of the 7800-foot altitude, rare to those from smoggy, industrial centers. After breakfasting at El Tovar Hotel overlooking the Canyon, the ASTE'ers were picked up by sightseeing buses. Merry cowboy guides drove them westward along the Canyon's rim.

An afternoon trip in the other direction through the Kaibab Forest had the Watchtower at Desert View as its destination. From this point the Painted Desert and mountains 80 miles away in Utah were visible beyond the 10-



Left: K. T. Norris, Los Angeles Industrialist, tells banquet audience of problems besetting West Coast industry. Right, top: Just before the banquet R. W. Ford tells a story to two other newly-installed directors, H. J. Richards and J. J. Demuth, and a couple of national officers. From left: Mr. Ford, V. H. Ericson, Mr. Richards, R. B. Douglas, and Mr. Demuth. Below: Edward Arnold, Hollywood personality and banquet toastmaster, good naturedly consents to autograph menus as fine forms to right. From left: I. F. Holland, Mr. Arnold and T. J. Donovan Jr.



mile wide gorge. On both drives there were frequent stops to admire the everchanging colors of eroded rock formations rising from the chasm floor a mile below. Then back to Canyon Village for the sunset ceremonial dances of the Hopi Indians. So to dinner at El Tovar and a final look at the indescribable natural phenomenon before boarding the waiting Pullmans for the last lap of the journey.

En route the *ASTE News* editor issued two transcontinental editions. A traveling passenger agent accompanied the party and handled arrangements for the smooth-running excursion. No incident or accident marred the trip.

\* \* \*

During the first meeting of the '48-'49 Board of Directors, October 12, its members authorized tentative negotiations for an industrial exposition at Cleveland in 1950, deferred regional meetings for the current fiscal year, adopted a budget of \$196,050, and elected a nominating committee to choose directoral candidates.

Although Chicago chapter had bid for the next tool show, Cleveland facilities were favored as more economical both for exhibitors and the Society. Dates set are March 20-24.

The board recognized that chapters have benefited from

A seasoned photographic model, this fawn at Grand Canyon, Arizona, poses patiently for snapshooters, while a woman member of the ASTE convention train party looks on. A. J. Gieringer (center) of Milwaukee adjusts camera for another shot.



## Board Business . . .

previous regional meetings, but endorsed the Finance Committee's recommendation that such area conferences be better prepared. Considerable time will be required to organize a new presentation, probably in the form of a clinic. In the interim a school for chapter officers will be conducted at the Pittsburgh convention, March 10-12.

Nearly all appropriations requested by committees were pared considerably by the Finance Committee. Even so, the approved budget figure runs somewhat higher than the \$150,000 set for '47-'49 annual expenditures, due to increased operating costs and special projects.

President I. F. Holland of Hartford, board chairman and presiding officer, nominated and the board elected as National Nominating Committee: W. B. Peirce, chairman, Pittsburgh; Anton Peck, Los Angeles; Wayne Kay, Detroit; Richard Smith, Hartford; and Earl Johnson, Dayton. This committee will prepare a slate of candidates for '49-'50 directors, to be considered at January chapter meetings. In February chapters will ballot for their respective delegates to elect a new board at the annual meeting in Pittsburgh.

Barring labor difficulties and other unforeseen problems, the publisher expects to release the "Tool Engineers' Handbook" in July. E. W. Ernst, handbook chairman, reported to the board. This is about six months under usual handbook publishing schedules.

Early next year a special prepublication offer will be announced. Subsequent income from the book is expected to eventually liquidate operating expenses of the committee.

During the luncheon recess, A. M. Sargent, housing chairman, read his report on the construction of the new headquarters building in Detroit. Justifying the board's decision to erect a Society home at this time, he quoted an excerpt from *Steel* that "no drop in building costs is in sight." Actual building operations were shown in a film.

Ray H. Morris, special housing finance chairman, outlined the plan worked out by his committee for financing the new building. Participating certificates in denominations of



Filling the ballroom of the Biltmore, the banquet (left and right above) climaxes the convention. Right: As the convention train pauses at Amarillo, Texas, G. S. Wilcox, Jr., of Detroit, checks the four-unit Diesel. Inset: Mr. and Mrs. J. A. Siegel, Detroit, smile contentedly after topping off their lunch at the Farmers Market, Los Angeles, with luscious, fresh strawberry shortcake. Lower: While strolling on the station platform at Clovis, N. M., William A. Dawson of Hamilton, Ont., banters Mrs. I. F. Holland, amusing President Holland and Carl Harrington (left) of New York.

\$100, \$500 and \$1000 are available to chapters and members. These certificates bear  $4\frac{1}{2}$  per cent interest, uncompounded, to be paid annually on the 20th of the month of issue. They are payable ten years after date of issue, but may be redeemed any time after one year at the option of the board.

Limit for a single subscription is \$10,000 and the total issue is \$110,000. Guaranteed by the full faith and credit of the Society, the certificates do not constitute a lien or encumbrance on any specific asset or upon the Society's property. The committee hopes that the issue will be spread among many small subscribers.

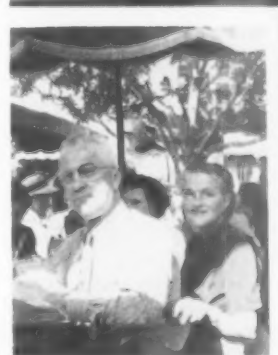
With completion of the headquarters building, George C. Johnson, finance chairman, recommended, the reserve fund could be reduced to \$100,000 from the previous figure of \$150,000, until termination of the building financing. An additional annual reserve of \$3600 for building and automobile depreciation also was included in his report. The Society ended its fiscal year with over-all committee expenditures well within the appropriation.

In Mr. Johnson's absence, Treasurer George A. Goodwin presented the finance report and budget. Both were approved by the board.

According to the report of Chairman Frank W. Curtis, the National Editorial Committee has adopted policies to elevate the professional status of *The Tool Engineer* and improve its contents. It has analyzed the need of "prepared papers" for greater prestige in industry and has initiated a program with other committees towards reaching this requirement. At regular intervals each chapter receives a chart showing contributions to *ASTE News*. Gilbert P. Muir has been engaged as editor of *The Tool Engineer*, to render editorial direction and execute committee policies.

The committee requested that its name be changed to "Publications Committee" and that its functions include control of all Society publications. Action was deferred for recommendation of a special committee.

While the Society now has no public relations director,





President Irwin F. Holland swears in three new directors at first meeting of the '48-'49 board. From left, standing: Robert W. Ford of Pittsburgh, Henry J. Richards, Boston; Jacob J. Demuth, St. Louis, and Mr. Holland. Seated: Grant S. Wilcox, Jr., Detroit; H. E. Collins, Houston; Victor H. Ericson, Worcester, third vice-president; George A. Goodwin, Dayton, national treasurer; Harry E. Conrad, Detroit office, executive secretary; Robert B. Douglas, Montreal, first vice-president; William B. McClellan, Detroit, national secretary; William B. Peirce, Pittsburgh, immediate past president; Thomas J. Donovan, Jr., Philadelphia; and Karl L. Bues, Golden Gate. Lower view: National committee chairmen attend board meeting to present reports and receive board's recommendations. Front, from left: Albert M. Sargent, Detroit, housing; Frank W. Curtis, Springfield, Mass., editorial; Edward W. Baumgardner, Cleveland, program. Rear: Joseph A. Siegel, Detroit, judicial-honor awards; William A. Dawson, Hamilton, Ont., professional engineering; Ray H. Morris, Hartford, special housing finance; Harry B. Osborn, Jr., Cleveland, public relations; Richard R. Linch, Los Angeles, constitution and by-laws; and Leslie B. Bellamy, Detroit, standards. Four are absent.



it has retained the services of John M. Cannon and Associates to carry out such activities on a somewhat reduced scale. H. B. Osborne, Jr., public relations chairman, also pointed out that his committee is endeavoring to visit as many chapters as possible, in the course of personal business travel. On these visits the committeemen distribute public relations brochures and discuss Society promotion.

The National Program Committee plans to engage more specialized lecturers to prepare papers for national meetings. E. W. Baumgardner, chairman, informed the board. As proposed, future convention schedules would feature several concurrent sessions on highly technical subjects.

Jointly sponsored by this and several other committees, a brochure on prepared papers is to include procedures for soliciting and processing technical papers in advance of national meetings. At the chapter level a number of top-flight speakers have been lined up on a tour basis, provided chapters will cooperate in arranging meeting schedules.

#### Will Strive to Reduce Membership Turnover

Placing emphasis on retention of present members, Fred J. Dawless, membership chairman, reported that no concerted drive is anticipated by his committee. To stimulate interest in membership activities, the committee is issuing a chatty news sheet to membership and chapter chairmen. Clarification of "approved technical school" was requested of the Education Committee, to permit enlistment of student and junior members. The committee suggested that a new formula be considered for awards honoring chapters with top membership ratings. Third Vice-President V. H. Ericson represented Mr. Dawless at the meeting.

Manuscript for another Society textbook has been completed and negotiations are under way for its publication. This is "Manufacturing Analysis," developed with the cooperation of Rochester Institute of Technology. H. F. Owen, education chairman, also advised the board that a second printing of "Jig and Fixture Design" is now available in cloth binding. In the interest of economy, the board temporarily postponed the committee's recommendation for establishing scholarships in the United States and Canada. A number of chapters have established local scholarships and awards, as announced from time to time in *ASTE News*. Mr. Owen's report was presented in absentia.

The Committee on Professional Engineering, said Chairman W. A. Dawson, will disseminate specific information to members in each state or province concerning licensing legislation in effect there. And it stands ready to assist them on professional matters. Wherever possible it will participate in drafting, revision and executing of state and national engineering licensing laws. Mr. Dawson recommended that "Professional Registration Laws and Engi-

neers," a book written and published by A. M. Sargent, supersede the brief which the committee was authorized to prepare; that 1000 copies of Mr. Sargent's book be purchased for distribution to chapter officers and committeemen.

Since March the National Standards Committee has mailed four sets of data sheets. It is now preparing sheets from some 70 manufacturers. This increased activity has resulted from renewed interest of many chapter standards committees, largely through personal contact by the committee's secretary.

Chairman L. B. Bellamy gave assurance that the Society's affiliation with the American Standards Association is continuing with greater participation in ASA committee setups. Suspended during the war, the ASTE-sponsored ASA Committee B-52 on classification of materials for tools, fixtures and gages is now being reactivated, he said.

A complete study of the constitution, by-laws, organization charts and procedures, with a view to clarification, was recommended by the National Constitution and By-Laws Committee. D. R. Linch, chairman, also requested board action covering violations of the constitution and by-laws and submitted proposed by-law amendments.

National Secretary W. B. McClellan reported meetings and planning activities of the national officers and directors. H. E. Conrad, executive secretary, promised better chapter service in the new headquarters building, indicated that he hoped to spend more time in the field, and suggested publishing special reports of unusual tooling problems.

J. A. Siegel, honor awards chairman, announced that his committee expects to collaborate with the Editorial Committee in establishing an award for technical papers presented at Society meetings and/or published in *The Tool Engineer*.

#### To Redesign Past Chairman Pin

The board instructed the national officers to design a smaller past chairman pin, and to handle recommendations submitted at regional meetings, answering directly to chairmen of chapters concerned. It adopted resolutions from the House of Delegates and voted to send an edited, verbatim report of the Los Angeles meeting to chapter officers.

After opening the meeting, President Holland swore in three new directors: R. W. Ford of Pittsburgh; J. J. Demuth, St. Louis; and H. J. Richards, Boston. Other directors present were: R. B. Douglas of Montreal, first vice-president; K. L. Bues, Oakland, Calif.; H. E. Collins, Houston; G. S. Wilcox, Jr., Detroit; T. J. Donovan, Jr., Philadelphia; and W. B. Peirce, Pittsburgh.

H. L. Tigges of Toledo, second vice-president, was unable to attend through government assignment to Washington.



# Air and Hydraulic Clamping for Jigs and Fixtures

*Automatic Clamping Cuts Costs and Speeds Production With Reduced Operator Fatigue*

**T**HE TOOL ENGINEER or designer, in selecting the type of motivating power—air or hydraulics—with which he expects to operate the clamping device on the particular jig or fixture that he is designing, must take several things into consideration. First, if he is considering the use of an air operated clamp, he must make certain that there is enough air available in that portion of the plant where the clamping device is to be located.

Many plants are experiencing difficulty with their air devices due to a large expansion in the use of air equipment without increased compressor capacity. Most plants operate on 80 to 100 lb. psi air pressure, but many have found that, with the over-burden on the compressors, the pressure will drop to a low of 40 to 50 lb in remote sections of the plant.

This pressure drop may have a very definite bearing on the action of the clamping device and upon the work piece. The drop in pressure may loosen the piece in the jig or fixture, thus resulting in material scrap. Tool breakage is another result of frequent pressure drops. If it is imperative that air power be chosen, then design should compensate for any pressure drops which may be anticipated.

Second, whether designing a new jig or fixture, or reconverting an old one, the cost of the power clamping equipment should be taken into consideration. In most instances the use of air equipment—consisting of an air cylinder, control valve, and lubricator—will be cheaper from the original purchase standpoint. However, the trend in many plants is

toward the "packaged unit" and this is where the individual hydraulic system meets with wide approval. With individual hydraulic power units operating each jig or fixture, a failure in any one of the units will not have a serious effect upon a production line, whereas using air power, a failure at the compressor may tie up the whole plant or drop in line pressure may seriously affect an individual job.

Third, the designer must decide which of these motivating powers will best work into the design and operation of his finished product. This will be determined by space, number of cycles of operation per day, location of equipment, and other considerations. A good general rule to follow is:

If your application requires a large amount of power, a minimum amount of space, average cycling, and normal heat, use hydraulics; if your application requires a medium amount of pressure, plenty of space, high cycling, high temperatures, use air.

Among the many advantages to be gained by the use of air or hydraulics over mechanical means for clamping of jigs and fixtures the following may be mentioned:

1. **Increased Production:** It is difficult to visualize the speed in production that has been accomplished by the use of the many air and hydraulic clamping devices. A recent survey, conducted by one of the large companies on the difference in time between air chucking and manual chucking, was concerned with round pieces

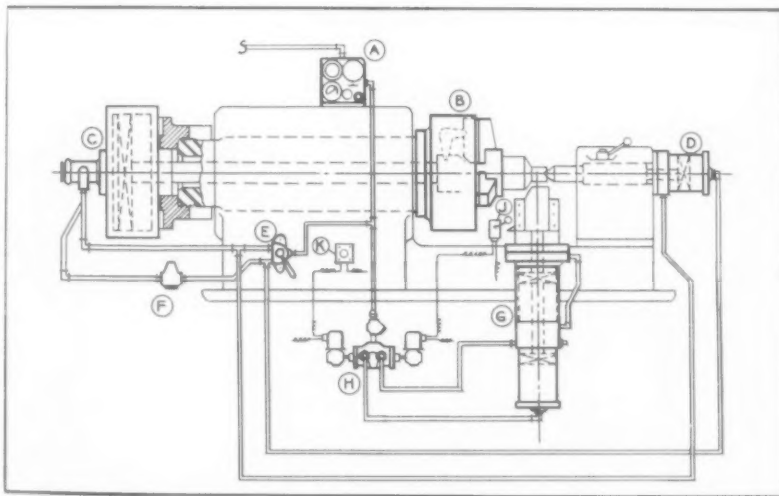
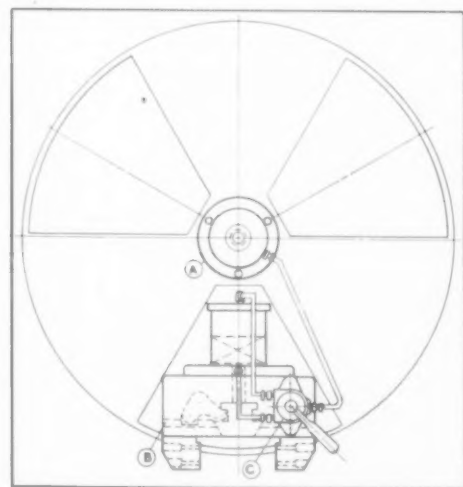


Fig. 1 at left, a typical air-chucking installation, further illustrated in the photo, Fig. 5. Air enters the circuit thru reducing valve, filter and lubricator unit (A) and passes to hand-operated master air-control valve (E) and solenoid master air-control valve (H). Operator places work in air-chuck (B) and moves handle of valve (E), allowing air to flow to tailstock cylinder (D), which moves the center against the work piece. Air-pressure builds up, opening sequence valve (F), allowing air to flow to rod-end side of rotating cylinder (C). When this cylinder moves to the back position, chuck (B) is actuated thru drawrod, clamping the workpiece. The spindle then starts to rotate. Operator presses electric contact (K), actuating valve (H) allowing air to flow to blind end of Air-draulic cylinder (G) which feeds the cutting tools. The feed of the cutting tool is controlled by needle valve on side of cylinder. Piston-rod of cylinder (G) advances until limit switch (J) is contacted, which causes valve (H) to reverse and it, in turn, reverses the air flow to cylinder (G). Piston-rod of cylinder (G) retracts at a rapid rate. Operator then stops spindle and reverses



handle on valve (E). Air flows to rod side of cylinder (D), backs off tailstock center and, at same time, flows to blind end of cylinder (C), moving drawrod forward and opening chuck (B).

Fig. 2, at right, a schematic layout of a 6-station indexing clamping fixture, further shown in the photograph Fig. 6. Air distribution (A) is connected to valve (C) by a short length of tubing. Operator places workpiece in clamping fixture (B) at Station 1 and actuates handle of valve (C) which directs air to rod end of air cylinder and closed jaws on clamping fixture (B), these jaws operated by a toggle which doubles the pressure exerted by the air cylinder. Fixture then indexes to station 2, where one operation is completed. Fixture then indexes to stations 3, 4, 5 and 6, each performing a separate operation. Again, the fixture if advanced to station 1 where operator reverses handle of valve (C) and air flow reverses in cylinder, causing the jaws of clamping fixture (B) to open, ejecting the finished work piece.

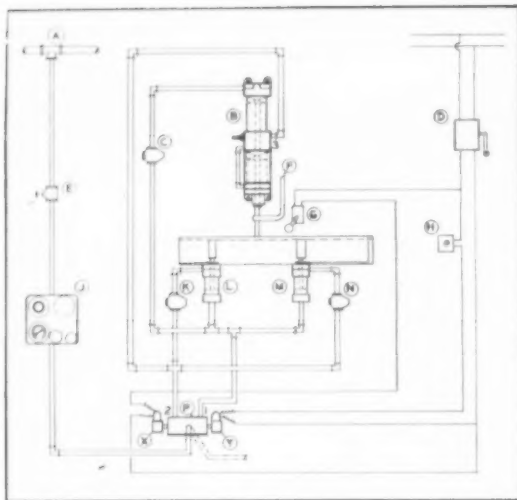
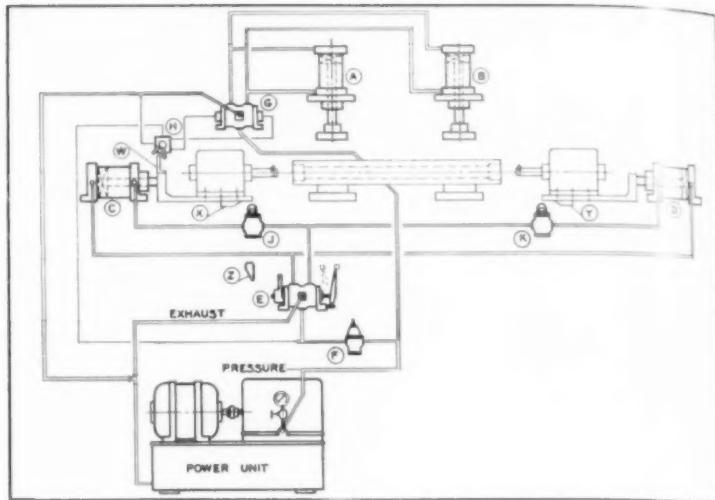


Fig. 3, at left, a typical air-hydraulic circuit with electric solenoid operated air valve, showing how an Air-draulic cylinder can be used in conjunction with a remote control master air-valve of the electric solenoid operated type. The complete cycle involves clamping the work, feeding the tool through the work, return and releasing the work. Smooth, controlled feeding and rapid return of the tool are provided by the Air-draulic cylinder. The speed at which it operates may be regulated by means of the adjustable speed control needle in the self-contained hydraulic circuit. Clamping and releasing of the work are accomplished by means of two air-cylinders and sequence valves properly located and adjusted. The master air-valve is actuated by a momentary contact push button switch and a cam-operated limit switch to provide the desired series of movements. In operation, the air shut-off valve in the intake from the main air line is opened and the RFL unit—air, regulator, filter, lubricator—is set for the desired pressure. The master electric switch is turned on. When the momentary contact switch button is pressed to start the cycle, the master air-valve (P) directs air from valve port No. 1 to holding cylinders (L) and (M) and sequence valve (C). After the air-cylinders have reached the clamping position, air-pressure builds up against the sequence valve (C) until the predetermined opening pressure is reached, whereupon the Air-draulic cylinder is operated to feed the tool through the work. At the end of the feed stroke, a cam attached to the piston rod at a pre-determined setting strikes the roller of the limit switch, thus reversing the position of the master air valve (P). Air is then directed from valve port No. 2 to Air-draulic cylinder port No. 3 and sequence valves (K) and (N). The tool is rapid-traversed to its original position, after which air-pressure builds up against the two



sequence valves. Valve (N) has a lower pre-determined pressure than valve (K) and, accordingly, air cylinder (M) releases the work before air cylinder (L).

Fig. 4, at right, a circuit layout of a special machine. During stand-by period cylinders A, B, C and D are in retracted position, as shown. The operator shifts valve (E) to position No. 1, thus directing pressure to blind end of boring-head cylinders, causing same to advance. Almost simultaneously, trip-dog actuates valve (H) to reverse valve (G), thus directing pressure to blind end of clamp cylinders (A) and (B), causing same to advance and clamp workpiece. While clamp-cylinders are advancing, cylinders are advancing, cylinders (C) and (D) are at rest, being "starved" of oil by action of sequence valve (F). When workpiece is firmly clamped, build-up pressure again opens (F), permitting oil to flow through valve (E). Cylinders (C) and (D) then continue their "out-stroke"—rapidly at first—until straight line cams actuate valves (J) and (K). Cylinder (C) should be somewhat "later" than cylinder (D), permitting latter to complete its out-stroke first. Then, when cylinder (C) completes its out-stroke, the latch on valve (E) is released, reversing same and causing cylinders (C) and (D) to retract rapidly. Near end of "in-stroke," trip dog actuates valve (H), reversing valve (G), causing cylinders (A) and (B) to retract and release workpiece. All action ceases.

Fig. 5, at upper left, shows a lathe with air equipment, this being a typical air chucking installation and supplements the circuit diagrams, Figs. 1 and 4. On the headstock of the machine is located the chuck and rotating cylinder, while on the

light enough to be lifted into the chuck by hand. The results are tabulated in Table I.

TABLE I—Comparative Time with Air and Manual Chucking

Size Chuck (in.)	Manual Operation (min.)	Air Operation (min.)
6	0.25	0.05
8	0.35	0.10
10	0.45	0.10
12	0.50	0.10
15	0.80	0.20

The average ratio of chucking time between manual operation and air operation is four to one. Hydraulic operation closely rivals air operation, depending on the size of the power unit used on the chucking machine. Table I shows only one of the many examples of increased production through the use of air and hydraulic devices.

2. Decrease in rejections and scrap: With the use of air and hydraulic clamps on various types of jigs and fixtures, parts rejections have been cut to a minimum in many plants. The use of air or hydraulic devices leaves nothing to the judgment of the operator. When the

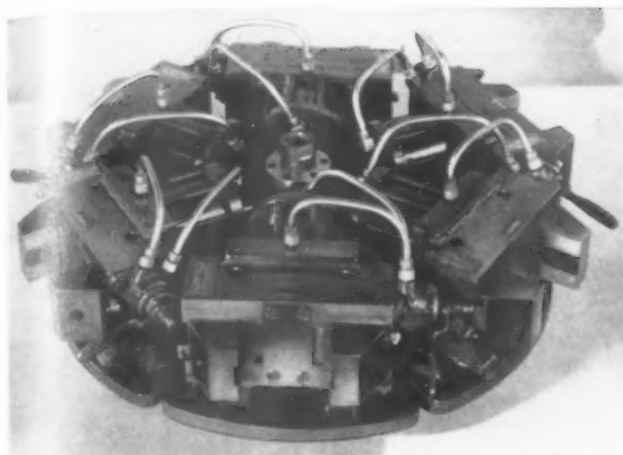
A graduate of the School of Civil Engineering of Purdue University, Harry L. Stewart joined Logansport Machine Co. in 1942 as a design engineer. In 1943 he became chief development engineer, and a year later director of research. In 1947 he was named assistant sales manager, with additional responsibility for special engineering.

operator shifts his master control valve he knows that he is always going to apply the same gripping pressure on the work piece whereas, if he is using some mechanical means, he is likely to apply a wide variation of pressure thus clamping the piece too tightly or too loosely.

If the piece is clamped too tight distortion or breakage is often the result, which means high rejections. If the piece is not clamped tight enough the result is movement of the piece in the fixture causing operations to be performed off location. Another result from loose clamping is high tool breakage. On rotating chucking fixtures, where the tools are plunged into the work, loose clamping may cause the piece to be thrown from the chuck, not only breaking the tools but endangering the operator.

3. Elimination of costly mechanisms: By the use of air or hydraulics, many complex and costly mechanisms may be eliminated. Expensive cams, gears, linkages and reducers may be replaced with a simple cylinder and valve. Where, under mechanical means, a setup may require many electrical and mechanical gadgets, it is likely that air or hydraulics will do the job more easily and cheaply. Many times on clamping operations, the operator may want to ease the clamp into position or change the speed of the clamping action depending upon the requirements of the job. This can easily be accomplished by an adjustment of a speed control valve.

On other applications, he may want to adjust or change the clamping pressure which can readily be done by adjusting the relief or reducing valve. On still other applications where clamping, tool feed, tool re-



tailstock is the tailstock cylinder and valving which sets up the cycling operation. Each end of the machine has a complete regulating, filtering, and lubricating unit. Photo by courtesy of Lodge & Shipley Machine Tool Company.

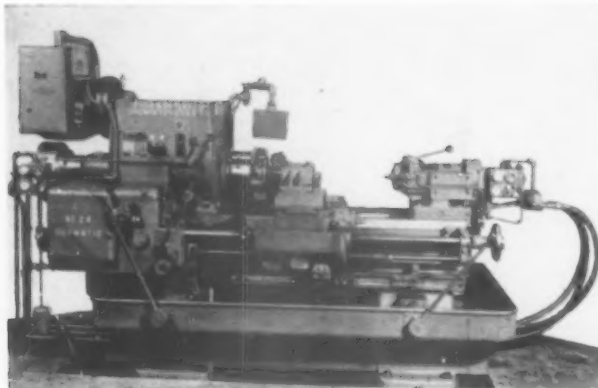
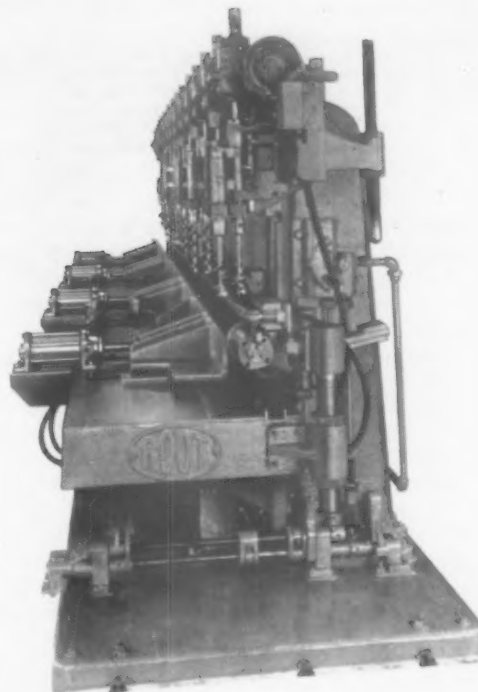


Fig. 6, at upper right, a photo of the special indexing clamping fixture shown in the circuit diagram, Fig. 1. The above photo shows six special air-operated clamping fixtures built into a very limited space and mounted onto an indexing table. Through the center of the table is a hub which houses the air distributor which directs the air power to the master valve on each clamping device. By the movement of the handle of the master valve, the cylinder is actuated causing the jaws of the fixture either to close or open depending on the direction of movement of the valve handle.

Fig. 7, at lower left, a brake shoe assembly press, the function of which is to assemble the brake shoe lining table to the web of the brake shoe. This large fixture is an excellent example of adapting hydraulics to a very heavy clamping application. Note the neatly designed pressure lines from the manifolds to the nine hydraulic cylinders. On the large hydraulic pressure lines on the left of the fixture all joints are welded except the flanged connections at the master control valve and large hydraulic cylinder. On top of the fixture is located the hydraulic pump and motor. Fixture is operated by electrical push-button stations at the front. Photo by courtesy of Wagner Electric Corporation.

Fig. 8, at upper right, a special wood boring machine for telegraph pole cross arms, all movements of which are automatically controlled, in sequence, by means of two solenoid operated master air-control valves. The cycle is as follows: the work moves through a channel until it strikes the end stop and trips an electric control switch, then, one solenoid-operated control valve actuates four air cylinders simultaneously to clamp the work. At the end of the clamping movement a cam trips an electric limit switch; this, in turn, operates a second solenoid operated master control valve which actuates the fifth air cylinder, automatically starting the foot trips which control the hydraulic table feed. The table then moves upward, feeding the work to the drills. Multiple wood boring operations are performed simultaneously. As the table feed movement is completed, another limit switch is tripped, and the second air valve reverses the table movement. This trips still another limit switch, operating the first air valve and releasing the clamping fixture so the work piece can be unloaded. Photo by courtesy of B. M. Coat Co.

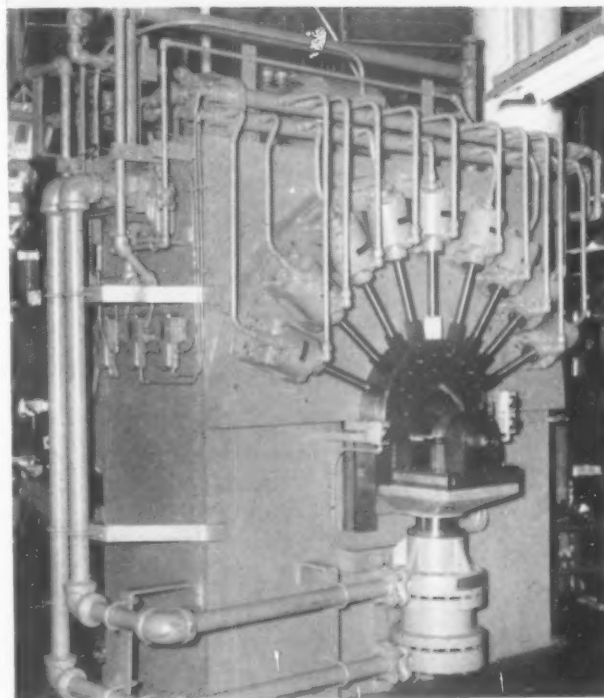


turn and unclamping must take place in sequence, very simple valving will easily and speedily produce the desired results. The elimination of costly mechanisms allow the designer to improve his equipment, both from a cost standpoint and in appearance.

4. **Reduced maintenance:** By the use of air or hydraulics for clamping, it has been found that maintenance has been reduced to a minimum. For the most part, components in both air and hydraulics are so designed that they will operate millions of cycles with very little care. The paramount thing in an air system is that the air should be kept clean, free from condensation and the system should be lubricated with a good lubricating oil. The oil should be one which will not gum up. Many plants use a combination of 50 per cent S.A.E. 10 oil and 50 per cent kerosene.

In a hydraulic system, it is necessary to keep the oil clean, change it at regular intervals depending on severity of service, and to make certain that the oil does not reach excessive temperatures which would result in packing failures. Components of both systems are so built that, if leakage should occur, replacement parts are easily installed without long periods of down time.

5. **Decreased operator fatigue:** Again, by the use of air or





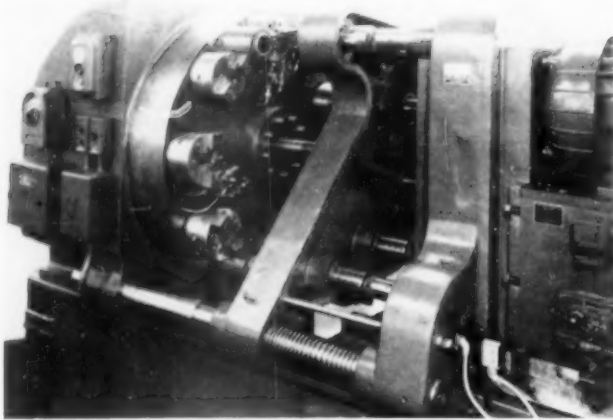


Fig. 9, at left, a special hydraulically-operated machine used to complete various boring, facing, and chamfering operations on a range of sizes of gas burners as used on gas ranges. The work is loaded into 2-jaw chucks which are operated hydraulically. Hydraulic power is furnished by a pumping unit mounted on the base at the end of the machine. The tools are held in spindles of a multiple-spindle head fastened to a self-contained hydraulic unit that furnishes power for the spindle rotation and the feeding into the work. The machine operates semi-automatically. After work is loaded and clamped into the chucks, a push button starts the machine through its cycle.

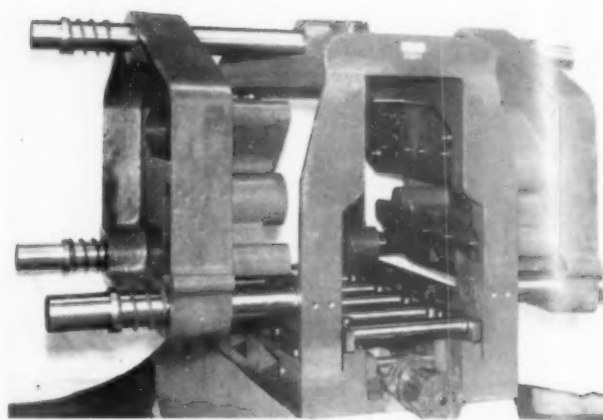


Fig. 10, at right, a special air-operated fixture designed with a traveling bushing plate on each side and used for drilling various size holes in the sides of Diesel engine cylinder blocks. The work comes to this fixture along a roller conveyor, a section of which is part of the fixture. This section of the conveyor is raised to the level of the conveyor on incoming and outgoing sides by means of cams which are actuated by an air-cylinder. After the work is loaded into the fixture, the air is exhausted from the cylinder, thus allowing the work to be lowered over locator pins and rest-plates while drilling takes place. The work is held in position by an air-operated clamp. Both photos by courtesy of Hoefler Manufacturing Company.

hydraulics, it has been proven conclusively that operator fatigue has been greatly reduced. On large mechanical clamping fixtures, hand operated chucks and manual operated presses, operators show peak efficiency at the beginning of a shift but, as the shift progresses, their efficiency gradually dwindles. This is not the case with air or hydraulically operated machines, as very little effort is required to produce the needed operations.

Many physical handicaps are caused from operators straining themselves in the operation of these mechanical clamping devices, whereas a simple flick of the wrist or a touch of the foot will operate the air or hydraulic device. A decrease in operator fatigue with attendant carelessness and work spoilage results and there is a tendency towards better employer-employee relations, as the worker becomes master of the machine, not its slave.

The applications of air and hydraulics to the clamping of jigs and fixtures are so numerous that it is difficult to comprehend the many places where these mediums can be used. Probably the most popular and productive single application of power clamping is that of air and hydraulic chucking fixture used on lathes. There is barely a production line in a modern plant that does not make use of large amounts of

this type of chucking equipment. With automatic controls for moving in the tailstock, clamping the piece, and feeding in the cutting tools, one operator may operate two or three lathes with ease, whereas by manual control he is kept busy on one machine.

Another good example is that of air operated clamping fixtures on drill presses. By the introduction of the Air-draulic cylinder—which is primarily an air cylinder with a hydraulic dash pot—automatic air equipment can be set up so that one operator can operate a battery of drill presses.

The operator drops the work piece into the fixture and, in so doing, trips a switch which causes an air cylinder to operate, thus securely clamping the work piece. Then a sequence valve opens, allowing air to the air-hydraulic cylinder and the drills are fed through the work piece at a smooth controlled feed. When the air-draulic cylinder reaches the end of the stroke a switch is tripped, thus reversing the air-draulic cylinder. When this cylinder reaches the top of the stroke another sequence valve opens and the cylinder on the air clamp reverses.

While volumes could be written on the merits, advantages and applications of air and hydraulic clamping on jigs and fixtures, the applications illustrated in Figs. 1 to 10 and explained in the captions may be considered timely.

## J. J. Kohl Elected President of Tool and Die Manufacturers

J. J. Kohl, president of International Tool Co., Dayton, Ohio, was elected president of the National Tool and Die Manufacturers Association at the annual meeting of the association in Milwaukee, November 14-16. Mr. Kohl headed a list of newly-elected national officers which included Centre W. Holmberg, president, August W. Holmberg Co., New York City, first vice president; R. H. Cope, manager, Bunell Machine & Tool Co., Cleveland, second vice president; J. H. Stanek, treasurer, Stanek Tool & Manufacturing Co., Milwaukee, treasurer; and Alfred Reinke, vice president, Gus Reinke Machinery & Tool Co., Hillside, N. J., secretary. George S. Eaton, Cleveland, executive secretary.

A. G. Bryant, president of Bryant Machinery & Engineering Co., Chicago, and a former president of the association, spoke at a luncheon held jointly with the Tool, Die and Machine Shop Association of Milwaukee on Nov. 15. Mr. Bryant, who recently returned from Europe after an extensive survey of current European business conditions, stressed the need for a recovery, rather than a relief, program for

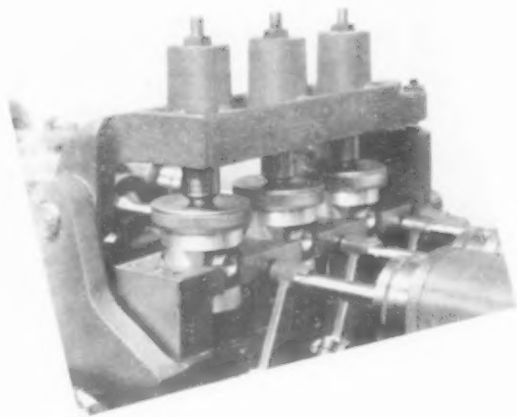
Europe. He explained that it was most important to provide for shipment of machine tools to Europe immediately rather than to attempt Continental restoration by continued shipment of finished consumer goods.

Presentation of awards of merit was one of the features of the Nov. 16 luncheon meeting; recipients included George Huebner, publisher of the Tool and Die Journal; John Benetz, president, Bridge Tool and Die Works, Philadelphia; and William R. White, Jr., vice president, Midwestern Tool Co., Chicago, who is the retiring president of NTDMA.

Considerable interest was shown by many of the 200 attendants at the meeting in current business conditions and their ultimate effect on the tool and die industry. Mounting labor and manufacturing costs, and the further effects of increased European exports and domestic defense orders were the subject of a number of "corner sessions."

The 1949 annual meeting of the association was scheduled at the Hotel Pennsylvania, New York City, Oct. 30-Nov. 2.





# Piston Pin Hole Production

By A. Francis Townsend

Heald Machine Co.

**I**N THE PAST, one very common method of boring piston pin holes was to utilize a two or even three station workholding fixture mounted on a double end machine with four or six boringheads, as shown in Fig. 1. Piston pin holes, having been core drilled in a previous operation, were semi-finished on one end of the machine and finished on the other. Tool retraction units were provided on the finishing end of the machine to eliminate drag lines if desired, which was almost always the case. Opinions varied as to whether pistons should be placed dome or skirt down while location and alignment was accomplished by any number of different types of aligning plugs. A number of disadvantages were inherent in this method. First, the rapid traverse time, or non-productive machine cycle time, was excessive. Loading was awkward and necessitated additional work table equipment. Location and alignment were separate steps before clamping could take place. Equipment price increased proportionately with a double set of boringheads and double end machine features. Pistons had to be core drilled first before coming to the machine.

Given a reasonable and normal stock removal (0.040-0.060 in) and material condition, (aluminum alloy) a simple and successful method for relieving these difficulties involves equipment as shown in Fig. 2. Pistons come to this two station, end operated, single end Model 221 Bore-Matic without the necessity of being core drilled. The operator loads two pistons, dome down, from a convenient loading platform integral with workholding fixture. Work is located by Vee blocks on pin hole bosses and clamped simultaneously by left and right hand push button stations at end of table (as a safety factor, both hands must be on push buttons to actuate). A large mushroom type button in the center of push button station allows operator to manually reverse table at any point in the automatic cycle for setup or emergency reasons. Machine cycle is started, the two boringheads which carry the two quills rotating at 7000 RPM start the rough and semi-finish "in" feed at 60 inches per minute. On completion of "in" boring the table automatically reverses at which point the feed rate changes to 18 inches per minute for the "out" feed finish cut. A jump cam enables the table to rapid traverse between bores on the "out" stroke. On completion of the bores, the table rapid traverses out to clear quills and pistons are unclamped automatically. Since the part is bored in both directions, there is no neces-

sity for retraction devices to eliminate drag line. It should be noted, as shown in Fig. 3, that the two-tooled quill has its tools set in different planes. Tool A on the "in" stroke takes the original roughing cut while Tool B, set slightly higher, follows through with a semi-finish cut. Because there is some quill deflection in taking the "in" feed cut the resultant springback of the quill on the completion of this stroke allows only tool B to contact work for the finishing cut on the "out" stroke. Machine cycle time is substantially reduced by eliminating unnecessary table travel (table actually rapid traverses only just far enough for quill to clear hole). And in minimizing operator effort in loading, locating and clamping. Additional "out" stroke to an extended position is available for tool setting, etc.

Speed and convenience alone, of course, are not enough. The equipment described holds tolerances of less than 0.0001 in. for roundness, 0.0002 or 0.0003 in. for size as desired (under normal stock conditions 0.040-0.060 in. on diameter).

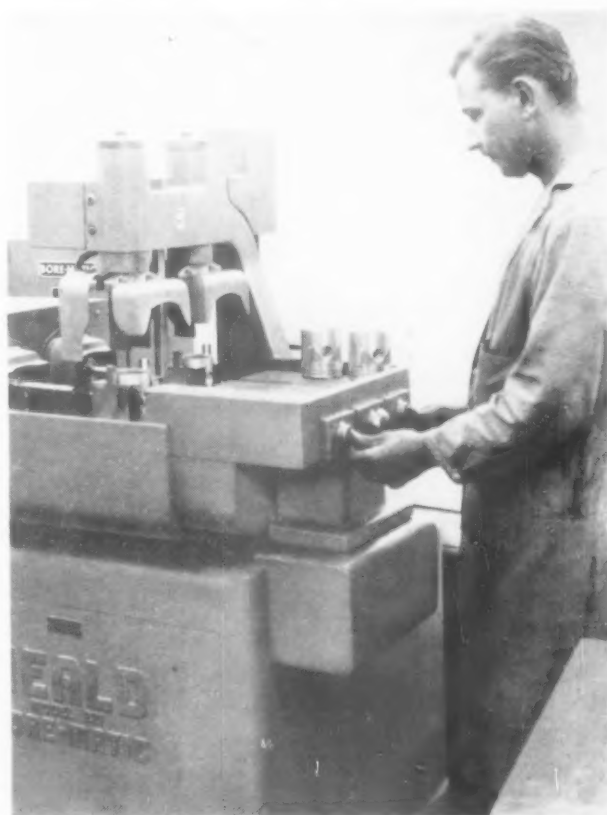


Fig. 1. (Above) Three station workholding fixture mounted on double end machine—a common method of boring piston pin holes. Fig. 2, at right, shows two station, end operated, single end Bore-Matic. Two pistons are loaded into workholding fixture, located by Vee blocks on pin hole bosses and clamped simultaneously by left and right hand push button stations at end of table. Machine cycle is started, with "in" feed at 60 in. per min. At completion of "in" boring, table reverses and feed rate changes to 18 in. per min. for "out" finish cut.

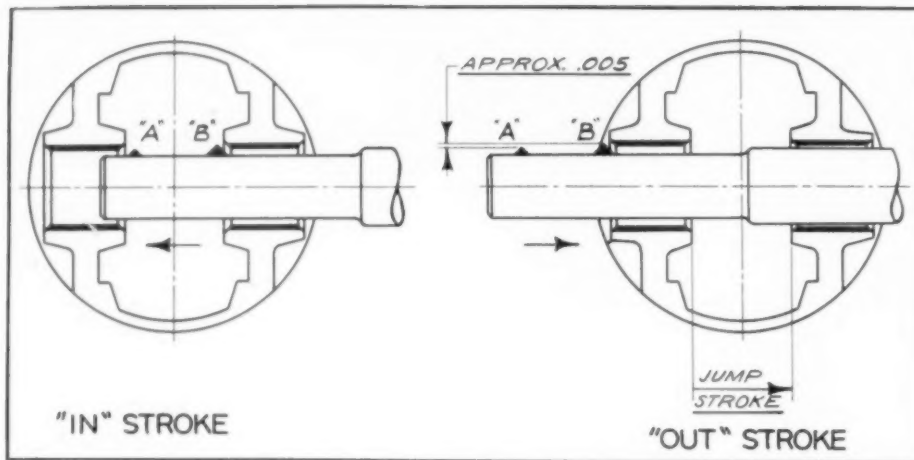


Fig. 3. Tools A and B on the two tool quill are set in different levels to facilitate cutting on "in" and "out" stroke. Tool A, on the "in" stroke, takes the original roughing cut, while tool B, set slightly higher, follows through with a semi-finish cut on the "out" stroke. Because of some quill deflection in taking the "in" feed cut the resultant springback at completion of the stroke allows only tool B to contact work for finishing cut on "out" stroke. Jump cam enables the table to traverse rapidly between bores on the "out" stroke.

Various requirements can be met depending upon material, stock condition and tolerances necessary.

Part of the reason for the faster machine cycle and consequent higher production lies in the fact that dead time—time when the tool is not contacting the work—has been considerably reduced. This has been done by two way boring with double tools, economical use of a faster and extremely short rapid table traverse and substantial reduction in handling time.

Hand in hand with general machine improvements goes the development of high speed boringheads. The boringheads used in the above application are the plain bearing type,

pressure lubricated and run at speeds in the neighborhood of 7000 RPM under normal conditions. This type of head combines the qualities of high speed with fine finishes. Ball bearing type heads of the high speed type are equally well suited to similar applications, a choice between the two types being dependent on finish requirements, stock condition and material.

This discussion of wrist pin hole boring of pistons has concerned itself primarily with aluminum alloy automotive pistons. Naturally pistons of all types—aircraft, diesel, etc.—require boring methods consistent with their individual material, stock condition, size, and production requirements.

## Some Factors in Carbide Die Construction

With increasing frequency during the past several years, carbide dies have been replacing and supplementing other die materials in many phases of forming, stamping and drawing of metals. Carbide die users and manufacturers have done considerable development work on carbide dies, and one of the former, Allegheny-Ludlum Steel Corp., which manufactures carbides and is a large user of carbide dies, has worked toward a standardized die building procedure.

This discussion is concerned primarily with the four general steps considered in the construction of carbide dies, and for simplification is based on the building of a simple draw die for the first operation in a deep draw job. The material to be used is 1/16 in. thick, cold rolled, with an ID of 4 in.

### The Carbide and Proper Support

In an effort to keep costs to a minimum, the first consideration is a minimum amount of carbide. In this case, since the ID is 4 in., experience suggests a 3/4 in. side wall. Since the carbide must be rigidly supported, caution in selecting the case material must be exercised. For this die a tool steel forging 9 in. OD and 4 in. thick is selected. Next a

shrink fit is necessary, and it will be noted in Table I that the carbide will close in approximately 0.002 in. on the ID. The case will be heated to about 700 deg F, which is below the draw temperature of the steel and thus will not affect its hardness. The casing operation is usually done before the ID of carbide is finished.

### Diamond Boring

Diamond boring is used on dies with one or more radii, or other contours which would be difficult to produce with a straight diamond wheel. The dressing of diamond wheels to suit certain contours, angles or radii is quite limited and costly with respect to labor and the initial cost of the diamond wheel. Therefore, in the case of the above mentioned draw ring, the drawing radius is 5/16 in., and this radius would be worked out with a diamond boring tool. A speed of approximately 100 to 120 surface fpm would be used. A 0.002 in. depth of cut and 0.004 in. feed per revolution would give best results. Lapping stock of 0.001 to 0.002 in. should be left on the radius after diamond boring.

### Grinding the Die

In grinding, a 100 grit vitrified diamond wheel, 100 concentration, should be used for roughing; a 180 to 220 grit wheel with the same concentration for finishing.

A recommendation on carbide surface grinding is to use approximately 0.0002 in. depth of cut, and about 0.0005 in. cross feed. About 0.001 to 0.002 in. stock should be left on the piece for lapping.

In general, carbide dies work best and give the longest life when lapped and polished to a high finish. Best results are obtained in polishing a round draw ring such as this at a speed of 1400 to 1600 fpm.

TABLE I—RECOMMENDED SHRINK FITS FOR CARBIDE ROUNDS

Nib Range OD		Shrink Allowance
From	Under	
0.437	0.562	.0013 — .0018
0.562	0.687	.0016 — .0021
0.687	0.812	.0021 — .0026
0.812	0.937	.0025 — .0030
0.937	1.125	.0028 — .0033
1.125	1.375	.0035 — .0045
1.375	1.750	.0038 — .0048
1.750	2.000	.0043 — .0053
2.000	3.000	.0045 — .005
3.000	3.500	.0055 — .006
3.500	4.000	.0065 — .007
5.000	6.000	.008 — .009
6.000	7.000	.009 — .010

# Internal Cooling of Grinding Wheels

*Grinding wheel absorbs coolant and delivers it at point of contact*

**I**NTERNAL COOLING of grinding wheels implies a method in which the coolant is injected into the wheel near its hub and expelled at the periphery by centrifugal force, as shown in Fig. 1. The method was developed to overcome difficulties common to grinding operations requiring liquid coolant—that is, that where flood coolant is used, comparatively little reaches the contact point of wheel and work.

In the case of deep cuts, for example, investigation has established that the bottom of the plane would not only be without coolant but raised to excessive temperatures. In grinding knife edges and thin, unsupported stock where radiation is limited, sufficient heat may be generated in a single pass to discolor the work. In a test grind on an alloy cutting tool, temperature at the tool tip soared to 2200 degrees F., impairing temper and causing breakdown. In all cases, nominally ample flood cooling has been employed.

On comparative tests with internal cooling, the maximum temperatures were lowered by 500 degrees. While still too high and demonstrating that quantity grinding of precision tools is subject to considerable improvement, the test clearly indicated the practicability of internal cooling.

However, the foregoing examples are extremes. In ordinary usage, the internally cooled wheel has definite advantages, especially for medium depth crush and form grinding. Efficiency drops off rapidly where the quantity of coolant delivered becomes insufficient to compensate for heat of contact—as, for example, where limited wheel porosity would restrict passage of coolant during a heavy cut.

For the general class of work, however, any bonded wheel capable of absorbing and holding a reasonable quantity of water would serve. The greater the porosity, the faster the

delivery of coolant. However, it is still too early to state which wheel is best for a given job, the accepted procedure being to start with an open-structure wheel and to work down to where coolant delivered falls short of the objective. Then, back off toward a happy medium.

As currently applied, the method is simplicity itself and can be adapted to practically any existing grinder. However, the DoALL Company, of Des Plaines, Ill., is producing a grinder—shown in Fig. 2—especially designed for internal cooling of grinding wheels. This machine has no provision for flood cooling. Rather, the coolant system consists of a one-gallon glass reservoir and two conduits, with visual drip from each, regulated by a valve. The coolant drips into a pair of hub flanges and soaks directly into the wheel. Centrifugal force does the rest.

In use, atomized mist is hurled from the periphery of the wheel, with the advantage that every grit of the wheel coming in contact with the work becomes encased in an envelope of moisture during one revolution. In spite of wheel velocity, however, the wheel will retain a coolant content for upward of three minutes before there is a noticeable decrease—providing ample time to refill the reservoir without shutting down.

While type of coolant is still subject to experiment, a simple emulsion of Drefit, vegetable oil and water has proven satisfactory. A small quantity of borax can be added if desired. At any rate, internal cooling of grinding wheels is entirely practical and provides means of applying coolant to places heretofore inaccessible to flood cooling. This feature alone warrants the serious consideration of users of high-speed grinding machines.

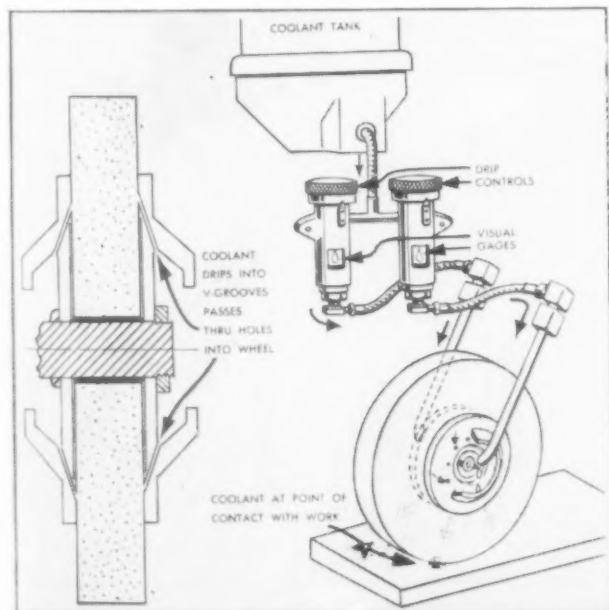


Fig. 1. Diagram of working principle of "cool grinding." Coolant flows from the reservoir to two drip controls, where it is metered to each of two outlets. These empty into ducts at either side of the wheel. From there, centrifugal force impels the fluid through the holes indicated by arrows and through the pores of the wheel toward its periphery, where it emerges as a fine mist.

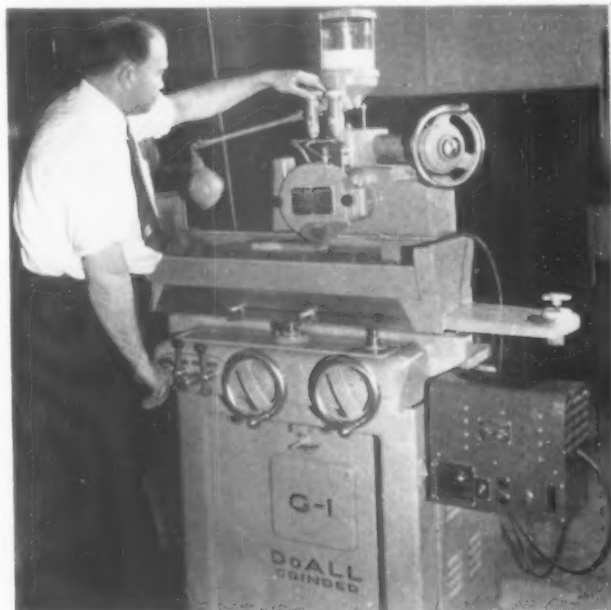


Fig. 2. A grinding machine, now in production by the DoALL Company, Des Plaines, Ill., designed for internal cooling of grinding wheels—or "Cool Grinding," as DoALL has named its system. This machine requires no reservoir for flood distribution of coolant; rather, operates entirely on the principle explained in Fig. 1. Both illustrations by courtesy of DoALL Company.

# Developments In Metal Stitching

WHILE ORDINARILY associated with the stapling together of office correspondence and memoranda, wire stitching—or stitching, to use the industrial term—is finding widening uses in mass production assembly. With special purpose machines, the method may be applied to assembly of metallic components made up of steel, aluminum, wood, leather, rubber, plastics and other materials as well as combinations of any or all of these. Typical applications are suggested in Figs. 1 to 7, along with explanatory captions.

Three terms are commonly used for the method—stapling, as when used in connection with pre-formed staples; stitching, when the machine forms its own staples with each stroke; and tacking, when the staple is driven into but not through the material. However, the common shop terms used are wire stitching, as applied to lighter duty applications such as book binding and similar work; and metal stitching, as where heavy-duty machines are used for assemblies that include metallic or other hard components.

While somewhat anomalous, as metal processing is ordinarily envisioned, the method is essentially sound and practical in principle and may best be explained by a homely verbal illustration. Were one to drive a slender finishing nail into hard wood, such as oak or maple, the nail would bend unless the hammer blow is straight-on or unless the nail has some side support, usually effected by the workman's fingers.

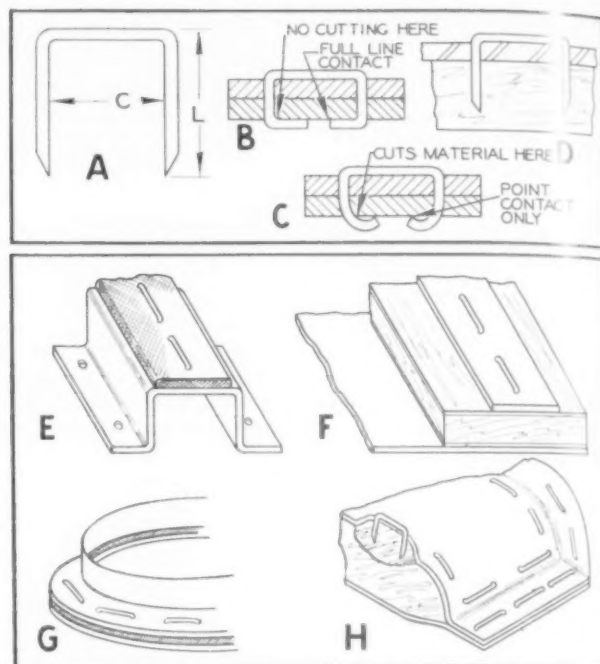


Fig. 1, at top, showing staple nomenclature. At A is shown a typical staple, "C" designating the crown and "L" the leg length. B shows a flat-type stitch, with solid clinching pressure, and C a curved type stitch with springy or weak pressure. In both cases the staple is clinched. Three terms are commonly used for stapling—wire stitching, as where the method is employed for assembly of soft materials; metal stitching, when employed for joining metallic components or combinations of hard and soft materials; and tacking, in which the staple is driven into but not through the material, as shown at D.

Fig. 2, at bottom, shows a few typical examples of metal stitching. At E is shown a fabric silencer strip metal-stitched to a formed U-bar; at F, a lamination of steel, plywood and aluminum; at G, felt is interposed between two components of a flanged gasket; and at H is shown a section of an aircraft assembly—the latter by courtesy of the Curtiss-Wright Corporation—which has been both metal stitched and tacked.

Analogous to this, one can drive a needle through a cork by first pushing the needle through a cork and breaking the eye end off flush with the top of the cork. The cork acts

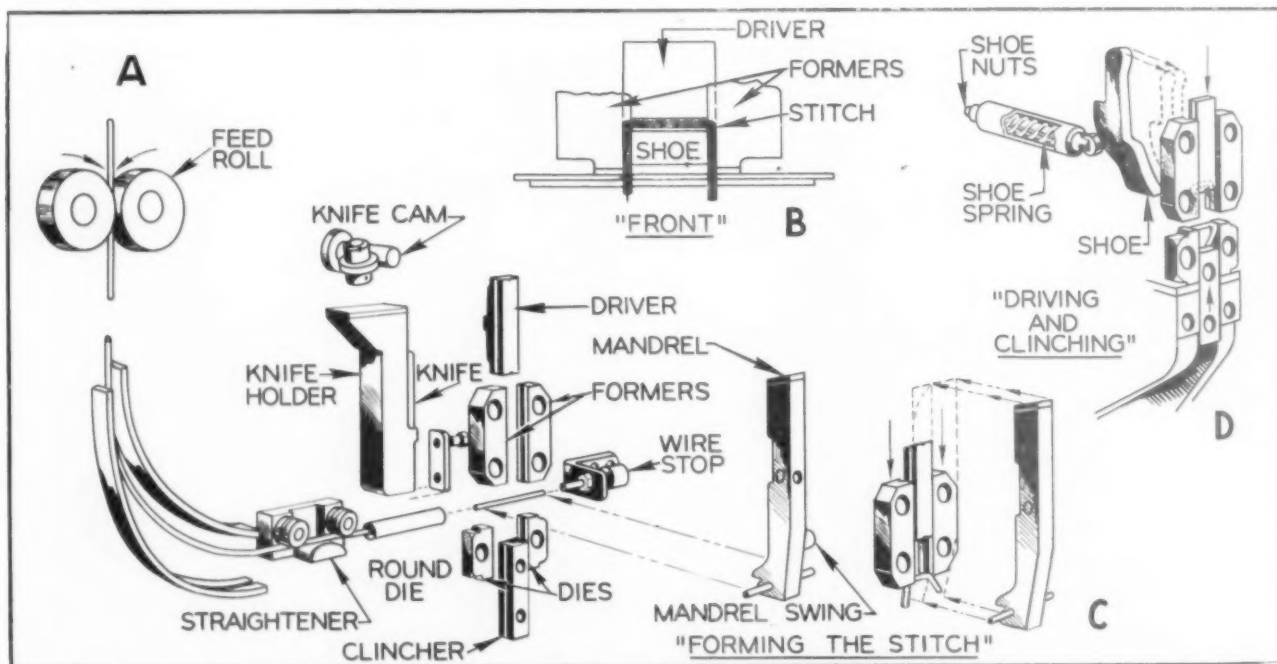


Fig. 3, a schematic diagram showing the general principles of operation of metal stitching. Coming from the coil, at A, the wire is fed by the feed rolls to the straightener and then through the cut-off die and knife, where the wire is cut to proper length for the material to be stitched. It is then formed by the forming dies, a driver coincidentally driving the staple through the workpiece. Sometimes the crown of the staple is slightly curved, to provide a cushion against the initial shock of impact. Further details of the sequence of operations are shown at B, C and D.



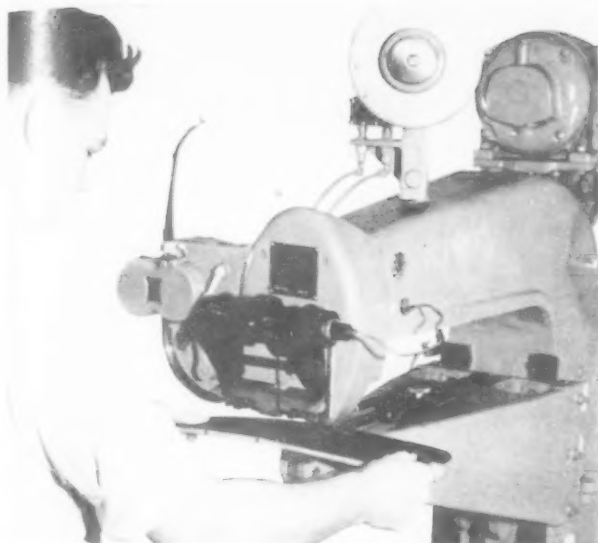


Fig. 4 shows a typical metal stitching machine—a heavy-duty Acme-Morrison, manufactured by the Stitching Wire Division, Acme Steel Company, Chicago, Ill. Metal stitching machines can also be integrated with conveyor lines for straight-line flow of materials.

both as a support and a guide bushing and the needle easily pierces the coin when struck a sharp blow with a hammer. Note the reference to a sharp blow; the needle will bend and snap off if pushed through.

Applying this illustration to metal stitching, the two legs of the preformed staple are guided and supported laterally by what may be termed the "dies" of the stapler and are driven through the material—as, for example, sheet metal—so fast that the wire hasn't time to bend. There is, also, a certain cushioning effect brought about by the shape of the crown of the staple, which absorbs the shock of impact.

Actually, the industrial metal stitcher—of which typical examples are illustrated—is a combination cut-off, pre-forming, piercing and clinching machine that, in the order stated, feeds the wire to the cut-off dies, where it is cut to required length, then forms the staple and drives it into or through the work, in the latter case clinching it as a final stage in the sequence.

The operation is extremely fast, and so tight is the clinching that components are clamped together as tightly as

though they were riveted. For that matter, metal stitching is closely comparable to riveting. Yet, control is so sensitive that, except as such soft materials as leather, rubber, or fabric may be slightly indented by the clinching—or wholly so in the case of sound-deadening strips—there is no appreciable distortion. Nor, for that matter, are there any marked protuberances that might detract from appearance or sales appeal.

Among the many advantages of the method is that holes need not be drilled or punched; consequently, no time is lost in lining up holes or inserting fasteners, as with conventional riveting or bolting together of parts. The metal stitching machine does all that, automatically and simultaneously.

Yet another advantage is that stitching can be done close to shoulders or upward-rising or downward flanges—say within  $\frac{3}{8}$  in. and  $\frac{1}{8}$  in. front or back, respectively. There is, however, a certain loss of strength in close-to-shoulder stitching since this implies vertical stitching which, being in the direction of shear, is the weakest of the three arrangements—vertical, horizontal and diagonal—commonly used. However, the vertical arrangement effects the least interference between the dies and the work.

Tooling, too, is rather simple for most applications. For many jobs, the backstop guide can be shaped to take two or more laminations, with provision for overlap, and this "tooling" may suffice for an assembly of small and easy-to-handle assemblies. "Jigs" may also be made from sheet steel, in which case simple indexing provisions can be provided by simply indenting the edges of the jig and mating these serrations with a locating pin. Where the nature of the work warrants, automatic or semi-automatic fixtures may be integrated with materials handling to achieve the ideal straight-line flow of production.

While practically any of the metals may be stitched, stainless steel included, there is a practical limit to the thickness which may be pierced at the present stage of development. However, the builders are developing heavier machines suited to heavier gage metals.

Naturally, this development portends broadened applications for a method of metal processing which has already effected marked economies throughout industry. For reduced to essentials, the metal stitcher is a real production tool; fast, reliable and, within practical limits, accurate for the class of work for which it is designed. As a cost-cutter, it is remarkably efficient.

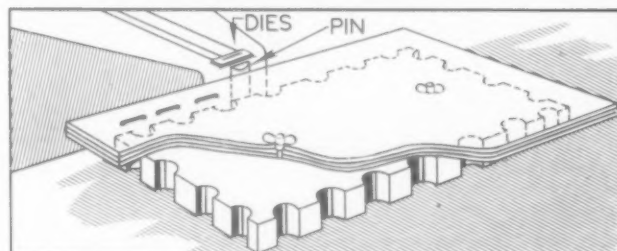
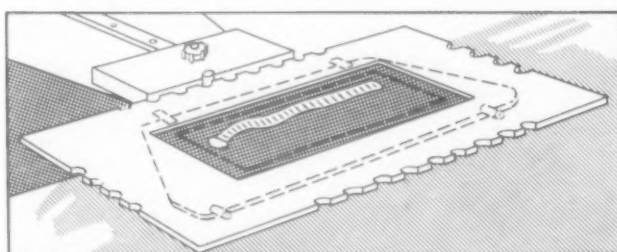
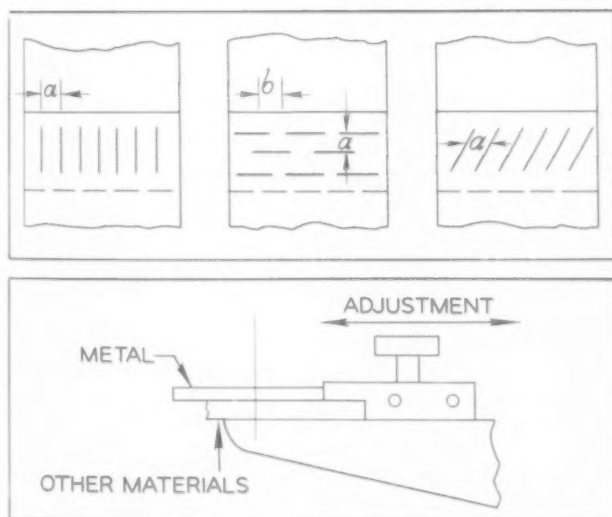


Fig. 5, at upper left, shows three types of stitching commonly used. At left is shown vertical arrangement, the weakest of the three since it is in line with direction of shear but used for close-to-shoulder stitching; at center, horizontal stitching, and at right, the diagonal arrangement, which is the strongest of the three.

Fig. 6, at lower left, shows how backstop guides may be shaped to accommodate two or more sheets of a lamination, and Figs. 7 and 8—upper and lower right, respectively—show how single stitching "jigs" may be made from sheet metal. Fig. 7 shows a design for inside stitching, and Fig. 8 for outside stitching. "Indexing" is effected by mating the serrations with the locating pin.

# Dies For Drawing Operations

Installment No. 7 of a Series on the Theory and Practice of Pressing Aluminum

Having previously discussed the theory of drawing metal in dies, we will now consider the tools used for drawing operations. These tools fall into two main groups, classified according to the type of press—double or single-action—with which they are used.

Because deep draws require long-stroke presses and uniform blankholding pressure throughout the stroke, large deep shells are usually drawn on double-action equipment. Large shallow shells may be drawn on both double and single-action presses if the latter are fitted with suitable die cushions and means of applying blankholding pressure. Both shallow and deep shells of comparatively small size are often drawn on single-action equipment, the higher speed of which tends to hold down production costs.

Double-action presses have advantages with regard to pressure control, while single-action presses have an advantage in speed of production. Therefore, design of tools depends more on the type of press equipment at hand, and on the size, shape and quantity requirements of the work than the advantage of one press over the other.

A typical standard double-action press is shown in Fig. 55. Here, the sequence of movement of both slides is auto-

matic, each coming to rest, simultaneously, with each revolution of the crank. However, if the clutch is set to repeat the cycle, and if automatic or chute feed be provided, the press may run continuously to produce with each stroke.

A single-action press employs just one crank action to operate the tools, and therefore requires supplementary springs or die cushions to obtain pressure on the blank. A draw tool in a single-action press—Fig. 56—may be compared with the draw tool for a double-action press, Fig. 57, to convey an idea of the general arrangement of tools in both types. See Table 5 for further comparison.

TABLE 5—COMPARISON OF DOUBLE AND SINGLE-ACTION PRESSES

	DOUBLE-ACTION	SINGLE-ACTION
Position of shell during drawing	Bottom side down	Bottom side up
Means of pressure control	Mch'l or hydr'lic	Die cushion
Type of pressure control	Constant	Increase with depth of draw
Class of work	Large	Small
Speed of production	Slow	Fast
Accuracy possibilities	Good	Excellent
Male member	Punch	Die plug
Movement of male member	Down	Stationary
Female member	Die	Punch
Movement of female member	Stationary	Down
Knockout location	In die	In punch
Relative equipm't cost	High	Low
Tools	Large but simple	Small but more intricate

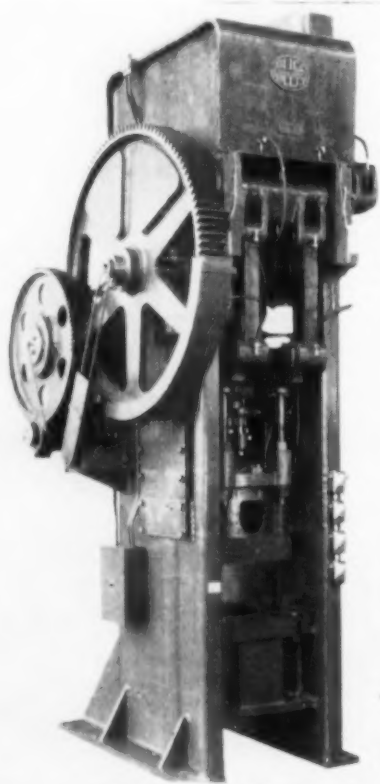


Fig. 55. A typical medium-size mechanical double-action press. The term "double-action" refers to the two slides used on this type of equipment—an outer or blankholder slide operated by a toggle action, and an inner or punch slide actuated by the crankshaft. In operation, the blankholder slide comes down first and remains in that position during the subsequent downward movement of the punch slide, which causes the punch to draw the metal from between the faces of the blankholder and die and into the die cavity. On the return stroke, a knockout pushes the shell out of the die. Photo by courtesy of E. W. Bliss Company.

Regardless of differences in terminology and design detail, draw tools for single and double-action presses are fundamentally the same and consist of a punch, a die and a blankholder. The work done by the tools, the resulting reaction on the metal, and types of stress and flow phenomena are the same. The tools differ only in application. Because of these differences, however, the tools for the two types of equipment will be discussed separately.

## Tools for Double-Action Presses

Tools for use in double-action presses may be divided into three classes based on the specific work being done by the tools, as follows: (1) Draw tools, in which a pre-cut blank is placed on the die and drawn to shape; (2) blank-and-draw tools, in which the blank is cut to size and drawn to shape in the one operation or stroke of the press; and (3) redraw tools, in which a drawn shell is further reduced by redrawing.

A plain draw tool for a double-action press, with descriptive caption, is shown in Fig. 56. With the addition of cutting rings and strippers, this would become a blank-and-draw tool as shown in Fig. 57. While the latter type saves one operation, there would be no economy if the savings on the total production run is less than the die cost.

## Design of Draw Punches and Dies

Double-action redraw and draw tools are quite similar in that they embody the same four main parts—a punch, a die,

*This series of articles is a collaboration between the author, Mr. Lengbridge, and Aluminum Laboratories, Ltd., of Kingston, Ontario.*

The tool shown in Fig. 56 is a plain draw tool. With the addition of cutting rings and chippers, as shown in Fig. 57—lower illustration—it would become a blank-and-draw tool. In plain draw tools, a pre-cut blank is placed in the tool and drawn to the desired shape. In blank-and-draw tools, stock in the form of a strip is fed across the die, which first cuts the blank to size and then draws it to shape.

a blankholder and knockout. The only difference is in their shape. See Figs. 58 and 59, with explanatory captions.

The material used for construction of draw punches depends on such factors as quantity requirements, the size of the tools, and the shape of the metal being drawn. Large punches may be cast from meehanite, nickel-iron, electrite or similar metals, but smaller punches should be made of machine steel or, when drawing deep shells, of hardened tool steel. Typical punches, are shown in Fig. 60.

Fig. 61—and Fig. 60—shows methods of venting, necessary to break the vacuum created by the withdrawal of the punch. If vents are too small, air cannot enter quickly enough and thin-walled shells may collapse from the partial vacuum. One large hole is preferable to several, both from a standpoint of cost and efficiency; for example, a 1 in. hole equals the combined area of seven  $\frac{3}{8}$  in. holes.

Usually, the bottom radius of a shell is specified by the customer, and the punch is machined accordingly. From the standpoint of breakage during the draw, however, this radius should not be less than four times the metal thickness. If sharp corners are required, they should be drawn as small as practical and sharpened in a later operation.

Generally speaking, the die is the most important part of the tooling. It not only determines the size of the shell, but also has to withstand blankholding pressure and wear at the draw radius. One point, in connection with cast dies, is that patterns should be marked so that the foundry will cast them face down in the mold. So cast, the slag and impurities rise to the top and leave the bottom face comparatively free from objectionable blow holes.

Dies, like punches, should be vented as suggested by typical die designs shown in Fig. 62. Where vents may be blocked off by the press bed, grooves should be run from the vent to a clear area, as shown in view G, Fig. 62. Vents in the knockout must also have access to the die holes. On round tools, the knockout may turn in the die, and if the vents are

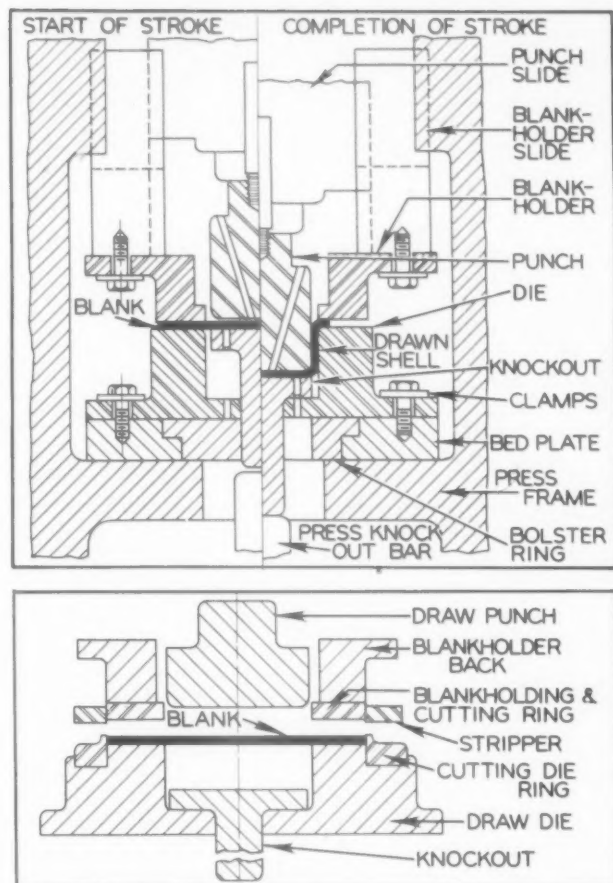


Fig. 56, at top, a draw tool installed in a double-action press, showing how the two slides operate the moving members of the tool—that is, the inner slide to which the punch is attached, and the outer slide which carries the blankholder. The die is clamped to the bed of the press, and the knockout is operated by a knockout bar from below the bed. On one side of the centerline, the blankholder is shown gripping the blank, with the punch just about to start the draw. The draw is shown completed on the other side of the centerline. The bolster ring in the bed plate provides support to the die and is made to suit the size of the die.

Double-action redraw and draw tools both consist of the same four main parts—a punch, a die, a blankholder and a knockout, as shown in adjacent Fig. 58. They may or may not be identical in shape, depending on whether the redraw tool is for final draw or further reduction, and design of reductions determine whether the nose of the punch be rounded or angular. The blankholder is a sleeve which fits inside the previously drawn shell, the nose being shaped to suit. The top of the die conforms to the previously drawn shell, for good blankholding contact, and the knockout is similar to those for plain draw tools. A 45° bevelled blankholder is shown at A, Fig. 59, far right, as it would appear when the punch is about to start a draw. The shell is shown partly drawn at B. A 30° angle, as shown at C, is sometimes used. When redrawing shells from thin metal, the method shown at D is more practical since thin metals require greater blankholding pressure and the flat nose shown exerts a more direct pressure on the shell.

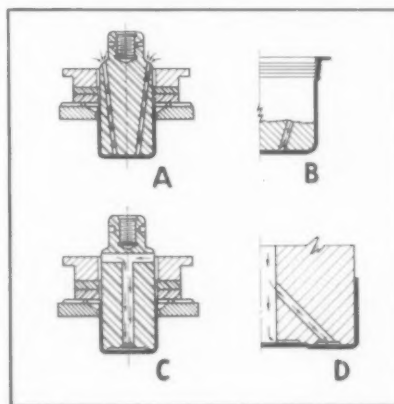
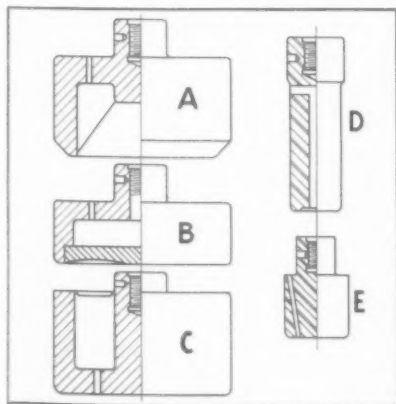
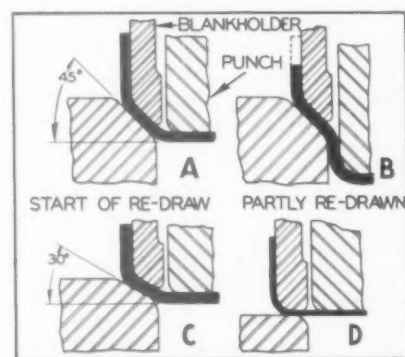
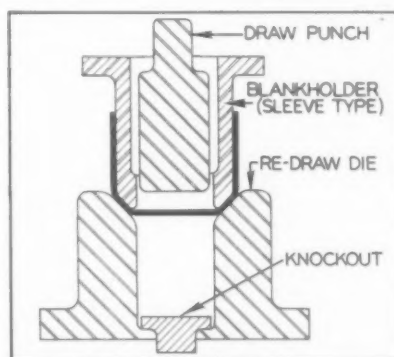
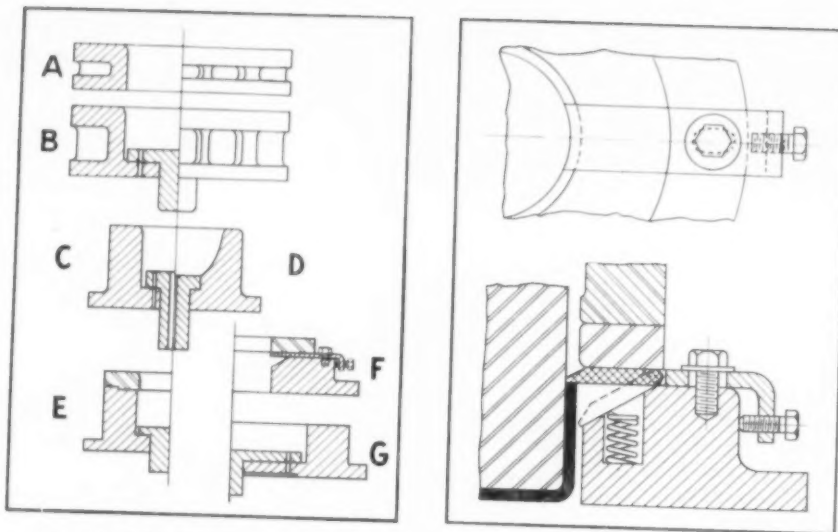


Fig. 60, at far left, shows typical draw punches for double-action presses. Punches A, B and C are cast and cored out to save weight. Punch A is bevelled, typical of first-operation shapes which are to be redrawn. Punch B, designed to form a curved contour on the bottom of a shell, is faced with a steel plate, while the large final-operation punch C is an alternate design to A and B. D shows a typical solid steel punch for a deep draw, and E is a typical solid cast punch for smaller shells. Note the venting, several methods of which are also shown in adjacent Fig. 61. As the punch ascends, and the shell remains stationary, a vacuum is formed which may result in collapse of thin-walled shells. Venting breaks this vacuum by allowing air to enter the bottom area of the shell as the punch is withdrawn. Venting may be done by drilling several small holes, as at A and B or by drilling one large hole, as shown at C. The latter is preferred, both from a viewpoint of efficiency and cost. On large solid punches, it is sometimes advisable to drill small side vents into the main hole, as shown at D; also, the bottom of the punch should be relieved, as shown at C and D.





Figs. 62 and 63, adjacent and far right, show blank draw dies for double-action press drawing operations. A and B are for large shells and may be made of low alloy steel, tool steel, or cast iron. C and D are excellent die materials although, when the metal to be drawn is thin, steel would be better since it can be hardened, ground and polished to assist flow. E and F are made solid as shown, while dies E and F are made of steel-faced dies for use on thin materials. Both dies are fitted with knockouts as shown, unless the metal is drawn through the die and stripped off by a stripper located under the die ring, as shown at F. Strippers are necessary when dies of this type are used for comparatively thick materials. The face of the knockout should be machined parallel to the die face, particularly when embossing. Venting, as suggested at G, is necessary in dies as well as punches, and this venting should be done in both the die and the knockout. Thin-walled shells should be stripped as they move up out of the die, and the hinged stripper shown at F and in detail in Fig. 63—far right—is an adjustable and dependable design.

connected with a half-round groove, as shown in Fig. 67, the air path is not obstructed.

Thin-walled shells should be stripped from the punch as it moves up out of the die. The hinge-type stripper shown in Fig. 63 is positive in action, adjustable and easy to set or change and may be removed for dressing or sharpening without disturbing the tool setup.

One of the most important points, in draw-die design, is the size and condition of the radii over which the metal is drawn. Too large a radius tends to increase metal pucker; if too small, resistance to flow is increased and severe thinning may occur when the metal is bent over sharp corners.

While proven data on draw radii proportions are lacking, established fundamentals make it evident that the draw radius should be proportional to the metal thickness, with slight modifications for hardness. The radius may vary from three to six—or more—times the metal thickness. The thinner and softer metals work better in the lower end of the range, the thicker and harder metals on the upper end.

For average work on aluminum, a radius equal to four times the metal thickness is satisfactory. For most dies, the draw radius is the true radius, but on thin soft metals a combination of curves and radii may be necessary to assist the metal into the die. Too small a draw radius has the same effect as bending metal over too sharp a corner; the outer fibres are stretched and metal is thinned out with possibility

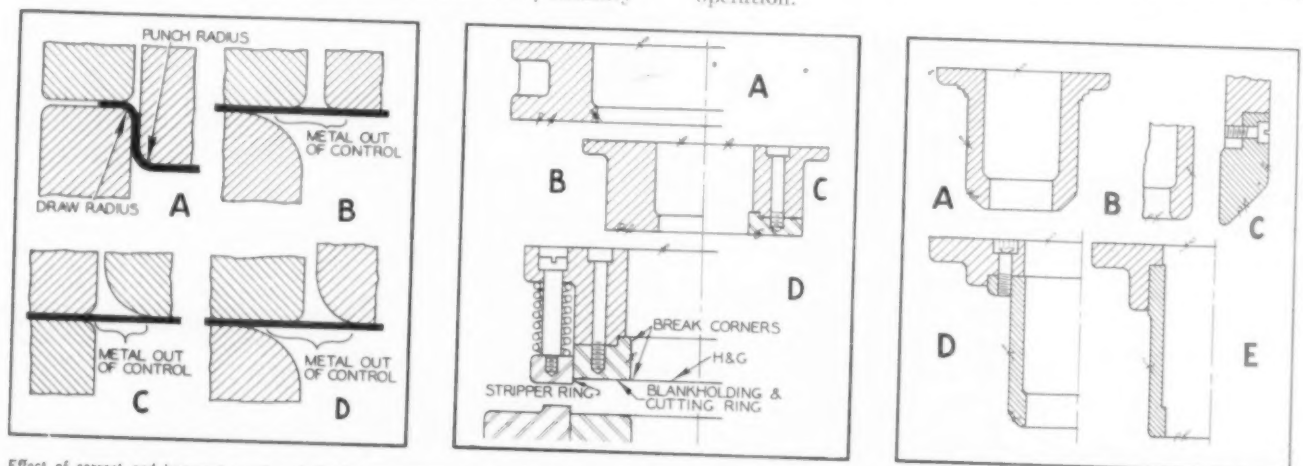
of fracture. See Fig. 64, A, B, C and D.

The draw surface of the die should be accurately machined, highly polished and smoothly blended with the draw radius. The inside surface is equally important, both as to finish and dimensions. Die space should be uniform all around the punch lest there be tight and loose spots around the die which would make drawing difficult. The die should not be bridged over too large a press opening, without support, as it may crack under load or at least be strained by springing into the hole underneath.

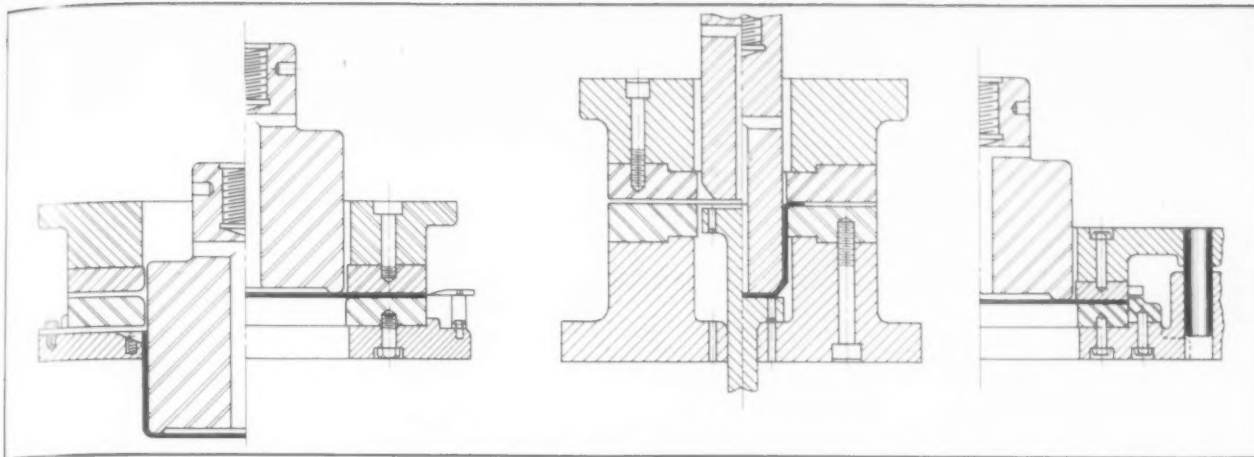
By machining the press plate to take a flanged ring, dies may be adequately supported by means of filler rings dropped into the flanged hole. Needless to say, the cutting edges should be carefully aligned with the guide pins because, in adjusting the blankholder—which carries the other cutting edge—it is quite easy to put the blankholder face out of parallel with the die face, fouling the cutting edges. The cutting die ring should be made of tool steel, hardened and shear ground.

### Blankholder Design

The blankholder component of a plain draw tool is similar in shape to a ring die. It operates from the blankholder side of the press, independent of the punch, and functions with the top of the die to provide control of the natural wrinkling tendency of the metal during the drawing operation.



Effect of correct and incorrect punch and die design is shown in Fig. 64, at left. A normal condition is shown at A. At B, the die radius is too large; at C, the radii on both punch and die are too large; and at D, the radius of the punch is too great, in all three cases throwing the metal out of control. Fig. 65, center, shows typical first-operation blankholders for double-action drawing operations, A being a large blankholder cored to reduce weight; B, one for a smaller tool; and C, a steel-faced blankholder for use on thin soft material. In the latter design, the bolts should hold the ring from the back to preclude holes in the blankholder face which might impede metal movement. If the steel ring blankholders for double-action press operations, A is a cast iron blankholder with a 45° angle on the nose to provide a holding surface for the succeeding draw. In case the reductions on the shell imply right-angle turns, the blankholder nose should be as shown at B. For long runs, it is advisable to face the nose with steel, as shown at C, although it might impede metal movement. If design C is used, the screws should hold the ring from the back, to preclude holes in the blankholder face which



Figs. 67, 68 and 69, left to right, show typical first-draw tools for double-action drawing operations, the illustrations showing knockout type, draw-through type and a blank-and-draw tool in the order stated. Fig. 67 is typical of a draw tool for use on aluminum, steel or brass. The draw surfaces are steel faced, and the blankholder back, the die shoe and the knockout are cast iron. The punch is meehanite, with the nose bevelled to form a bevel on the bottom of the shell for a redrawing operation. This comparatively simple tool would draw a pre-cut blank to the shape shown at right of the centerline. Fig. 68 shows a draw-through type of tool. Strippers located under the draw ring strip the shell from the punch on the up-stroke, and the shell drops into a receptacle or onto a conveyor located under the press bed. The nose of the punch is machined with a radius, for use with a thin-walled aluminum shell which is to be redrawn. Substantial venting area is provided since the combination of parallel walls and thin metal would present difficulties in stripping the shell from the punch without tearing. Fig. 69 shows a typical blank-and-draw tool, this differing in design from Fig. 69 in two respects: a cutting ring and a stripper ring have been added, and it is fitted with guide pins to insure the correct alignment of the cutting edges.

Plain draw blankholders fall into two general kinds: flat blankholders for first operations, and sleeve-type for redrawing operations. Typical blankholders of both types are shown in Figs. 65 and 66, with functions explained in the captions. It might be added, however, that the finish and accuracy required for dies also apply to blankholders except that the inside surfaces do not need to be polished. Nose radii of redraw blankholders should not be too sharp and should be smoothly rounded.

Typical design assemblies of draw and re-draw tools for use in double-action presses are shown in Figs. 67 to 72.

Another draw tool of the "draw-through" type is shown in Fig. 68. Figs. 71 and 72 show typical redraw tools for these shells.

The blank-and-draw tool shown in Fig. 69 differs in design from Fig. 68 in two respects: A cutting ring and a stripper ring have been added, and it is fitted with guide pins so as to insure correct alignment of the cutting edges. A redraw tool for the shell drawn in the die shown in Fig. 67 is shown in Fig. 70. This tool is suitable for shells of substantial thickness on which a flange is required.

If no flange is required, the shell may be drawn through

and stripped off the punch as shown in Fig. 71. Fig. 72 shows a redraw tool similar to that in Fig. 70 except that the metal is moved through a right-angle turn instead of a 45° bevel. An embossed pad is formed in the bottom of the shell by the punch bottoming on the knockout.

The design of draw and redraw tools for double-action presses may vary in detail from those illustrated, but the fundamental requirements are the same. The essential components are: A die, which serves to determine the size of a shell and to function with the blankholder in keeping wrinkles and puckers from forming as the metal is made to flow; and a punch with which to actuate the movement of metal into the die.

The tool components may be solid or cored, and draw surfaces may or may not be steel-faced. Standard or special iron, or steel, may be used in the construction of the parts, depending on the size of the product and quantity to be run, the kind of metal being drawn, and allowable tool cost. All these factors must be considered and the tooling designed to fit the job under consideration.

*Draw tools for single-action presses will be discussed in Installment No. 9, January issue, The Tool Engineer.*

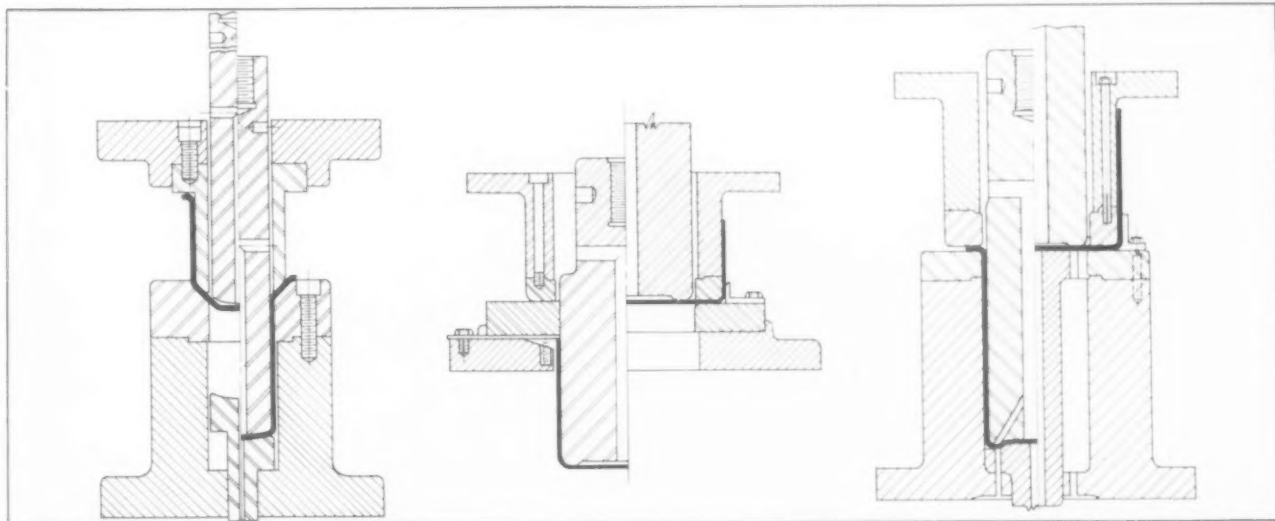


Fig. 70, at left, shows a redraw tool for the shell previously drawn in Fig. 67. The sleeve of the knockout fits inside the shell and grips the bevelled nose of the shell, which is resting in the die. The punch redraws the shell and bottoms on the knockout at the end of the down-stroke to form a dome on the bottom of the drawn shell. This tool is suitable for shells of substantial thickness on which a flange is desired. If no flange is required, the shell may be drawn through and stripped off the punch as shown in Fig. 71, at center. Fig. 72, at right, shows a redraw tool similar to the one shown in Fig. 70, except that the metal is moved through a right-angle turn instead of the 45° bevel. An embossed pad is formed on the bottom of the shell by the punch bottoming on the knockout.

## Precision Boring Tool Design

By A. E. Rylander  
Installment No. 5 of a Series

IN PRECEDING INSTALLMENTS in this series, we have discussed fixtures, boring bars and tool holders for the general run of boring operations. We will now take up precision boring, such as finishing operations which require no further processing except as, on occasion, honing or lapping may be necessary for the present ultimate in micro-smoothness of bored surfaces.

There are several requisites for precision boring, all of them important if one is to obtain optimum results. These are, although not necessarily in the order named: (1) A precision machine, incorporating plenty of "iron" to insure rigidity, a spindle running in precision bearings and balanced to cancel out vibration, and the essential combination of high spindle speed and slow feed. However, the general run of standard-precision boring machines meet all these requirements.

(2) Rigid, precision-built holding fixtures, with clamping arranged to prevent distortion. For example, clamping directly over a hole may produce a round hole as far as the actual boring is concerned, but springback may ovalize the bore when the clamping is loosened. And here, out-of-roundness of even 0.0001 in. or less may be enough for rejection, thereby cancelling out all other provisions for accuracy. See Figs. 23 and 24 for "right" and "wrong" clamping.

(3) Rigid, precision-built tool holders, with cutting bits solidly mounted and, within reasonable limits, solidly backed to prevent chatter. Tool bits must be tightly held, in view of the comparatively brittle materials used for high-speed

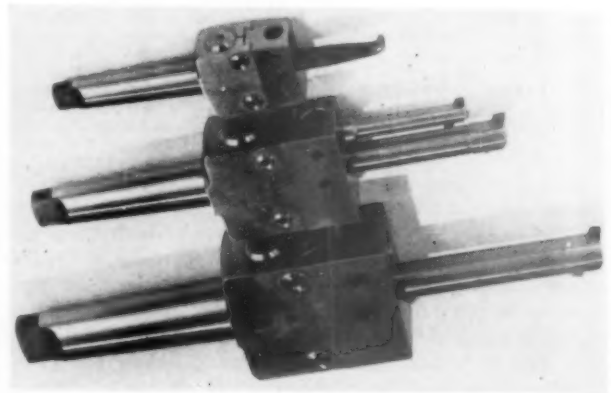


FIG. 26. Precision boring tool holders or boring heads with micrometer adjustment. The dial gives readings in thousandths, with vernier readings in 0.0002 in. While shown with square tool bits, the bars can be provided for round bits or for round-shank diamond tools such as shown in Fig. 25. The holders shown, which provide a range up to 15 in. in diameter, are Mastur precision boring heads manufactured by the Maxwell Company, Bedford, Ohio.

boring tools. Methods of backing were shown in Figs. 19, 20 and 21, installment No. 4. Standardized boring heads, such as shown in Fig. 25 and also in Fig. 14, installment No. 3, usually meet the requirements of precision and rigidity.

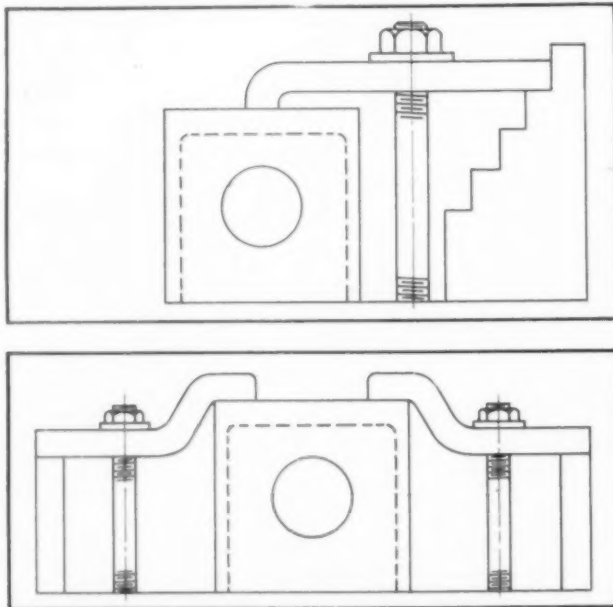
(4) The "right" cutting tool for a given job, this depending largely on the material to be bored. In precision boring, the essential requisites for cutting tools are smoothness of cut and resistance to wear. Without wearability, a tool may dull enough, in a comparatively long bore, to cut a taper along with a progressively impaired surface finish. Or, wear may necessitate recurrent tool changes during a production run, thereby lowering production and adding to expense of tool up-keep.

Because of the high surface speeds required for precision boring, it is obvious that neither high-carbon nor high-speed steel will meet requirements. The favored materials for cutters, then, are the tungsten carbides and diamonds, with synthetic sapphire coming along as a "dark horse."

Because of its hardness and resistance to wear, and further in view of its low cost, tungsten carbide is the most commonly used material for precision boring tools. Also, the bits have been standardized, in squares and rounds, and may be ground in sets to provide accumulation for quick interchange during a production run.

### Diamonds and Sapphires

The diamond is the hardest substance known and is therefore the most resistant to wear at high speeds. However, the diamond will not stand up under comparable shocks of impact nor, despite that at least one prominent maker implies their use for machining tungsten carbide, are the makers in



For precision boring it is essential that workpieces be accurately and securely located and so clamped that subsequent unclamping does not cause springback, with possibility of distorting an otherwise accurate bore. A clamp tightened down over a hole, as shown in Fig. 23, upper illustration, would distort the bore. The "right" clamping is shown in Fig. 24, lower illustration. The illustrations are informal and should not be construed as recommendations for design.



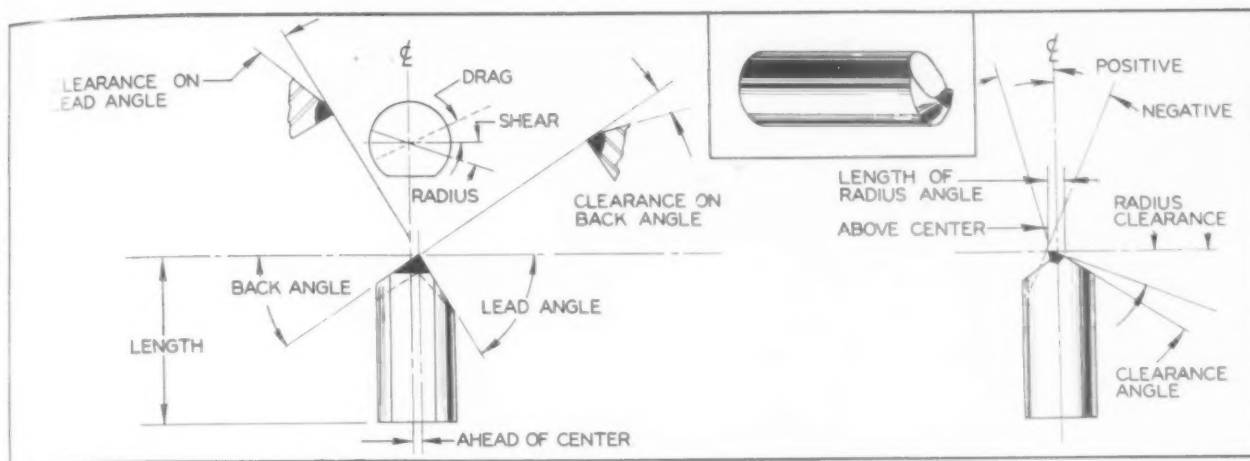


FIG. 25, showing recommended cutting angles and clearances for diamond tools. Note the backing provided for the diamond bit, an essential feature of diamond tool design in view of the comparatively fragile nature of the inset. Clearance angles must conform to the diameter of the bore; that is, the smaller the diameter of a hole, the greater the clearance angle required to avoid rubbing. Illustration by courtesy of Koebel Diamond Tool Company, Detroit, Michigan.

general inclined to recommend them for machining ferrous materials. For finish, accuracy and economy in production, however, it is doubtful if any metal at present stage of development can compete with the diamond tool in the precision machining of non-ferrous metals and materials.

While comparatively little attention has centered on the sapphire as a cutting tool, the fact is that natural sapphire was used at least 35 years ago for turning hardened steel instrument components. And at the last previous ASTE Tool Show, a demonstration of metal turning with a synthetic sapphire-tipped cutter gave indication that this material may fill the comparatively wide gap between tungsten carbide and diamonds.

Clearance and rake angles that would be suited for rough boring will not serve for precision boring. For one thing, negative rake is out. The shallow depth of the cut cancels out any advantage to be gained from the negative rake, and one does not readily reconcile precision boring and interrupted cuts such as a negative rake tool will bridge.

Rather, the rake and clearance angles of precision boring cutters are acute rather than obtuse or even flat, although the latter may be used at times, especially where a hooked tool might gouge into soft, clingy material. Recommended and preferred rake angles are shown in Figs. 25 and 27. For best results, cutting tools should be ultra-sharp, with the cutting edges stoned or honed after grinding if metallic bits are used. Even the microscopic serrations left by a grinding wheel may impair surface finish.

### High Surface Speeds Required

For the ultimate in surface finish, there must be the combination of high surface speed and slow feed. There is a reason. A slow cutting speed will tend to tear the metal being bored rather than to cut it, and naturally, the higher the ratio of speed to feed the finer the chip per revolution of spindle. Yet, too fine a feed will cause a tool to scrape rather than to cut; therefore, the feed must be set so that the tool will cut a definite chip.

Speeds vary with the material being cut, such non-ferrous metals as brass, bronze and aluminum requiring higher speeds than the ferrous metals. For the tungsten carbides, speeds will range from about 150 sfpm for some of the ferrous metals to 1500 and over for aluminum. Speeds for diamond tools range from 600 sfpm to 1100 and over. Apparently, then, tungsten carbide has the greater range although the diamond would have an advantage in sustained keenness of cutting edge.

One thing, to bear in mind in precision boring, is that the rough bore must be accurately aligned with the spindle travel for the finishing cut. This is not only essential since the finishing tool will only remove a few thousandths of stock, but also because the finishing tool could not produce a truly round hole if rough and finish bores are eccentric in relation to each other. The heavy side of the cut might spring the tool enough to cause out-of-roundness.

Coolant is an essential in practically all precision boring, and especially so for diamond boring. The high speeds generate heat, and this alone might cause distortion as the work-piece cools. One function of coolant, then, is to maintain an even temperature, and another is to wash away chips which might become wedged under the cutter and mar the surface. Obviously, both volume and velocity must be adequate to achieve good surface finish.

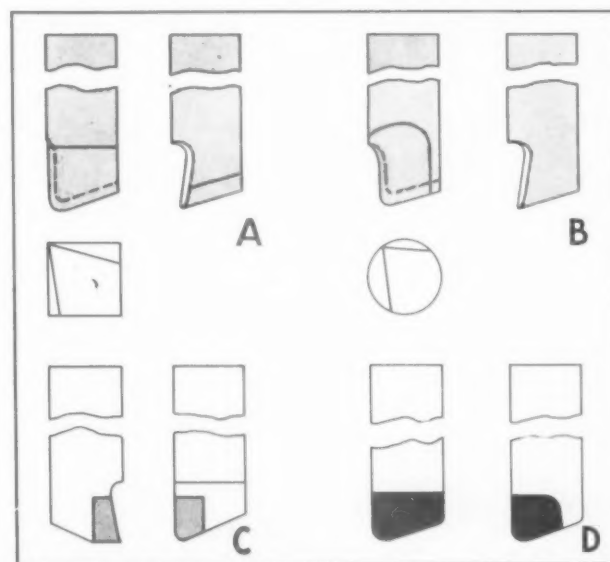


FIG. 27, showing types of cutter-bits for precision boring. At A, square tungsten carbide bits, and at B, round tungsten carbide bits. The former are preferred because, in the first place, less stock need be ground away in shaping the cutting edges, and in the second place, they lend themselves more readily to gang grinding—that is, in duplicate sets—and may be set into the tool slots at the designated angles. At C, is shown a small tungsten carbide bit inset into a high-speed steel square shank, this base metal being preferred to mild steel because of its greater strength. At D is shown suggested mountings for synthetic sapphire tool bits, also cemented onto high-speed steel bits. It is essential that all fractureable tool materials be solidly backed. Note that all tools have positive rake and that the noses of the tools are slightly rounded.

**Installment No. 6 will follow in January issue.**

# GADGETS

Ingenious Devices and Ideas to Help  
the Tool Engineer in His Daily Work

## Automatic Two-Position Stop

The 2-position stop, shown, was designed and built for a drilling application on a milling machine. The parts being drilled are circular plates with a series of blind holes, drilled into the periphery at two specific depths, as shown in Fig. 1. The holes are alternately deep and shallow. The work is indexed from hole to hole on a universal indexing head. It may be noted, here, that the depth of the holes is controlled by the closing of a limit switch which operates a solenoid to disengage the feed clutch.

Previously, it was necessary to handle the work twice on individual setups, one for each series of deep holes and one for each series of shallow holes. This was due to the fact that the arrangement previously fastened to the milling machine table to contact and operate the limit switch was only good for one depth of hole.

The 2-position stop—Fig. 2—involves the use of two screws, A & B, which are carried in a transfer plate, D, and can be set to their positions and locked by set screws E, which give the differential C between the hole depths. The end view, and section A-A, show the screw B to be in position necessary for contacting the limit switch. This screw is set for the shallowest hole.

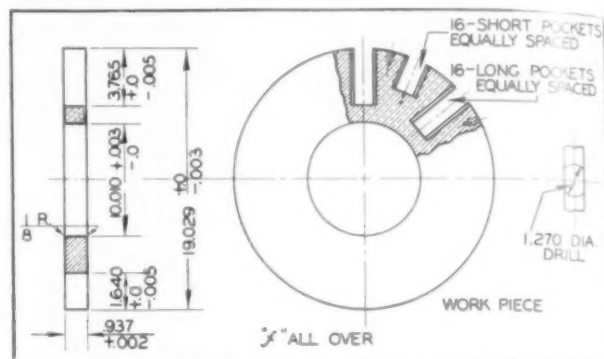


Fig. 1. The part, with the major portion shown blank and a small portion in section to show the alternately deep and shallow holes.

The stop arrangement is shown at the returned position of the milling machine table or saddle. This arrangement is mounted on a T-shaped bar, F, which is carried in a corresponding T-slot in the saddle and may be positioned and locked therein to suit each setup. This arrangement is actuated by a cam, G, which is adjustably mounted on a bracket, H, which in turn is fastened to the milling machine bed.

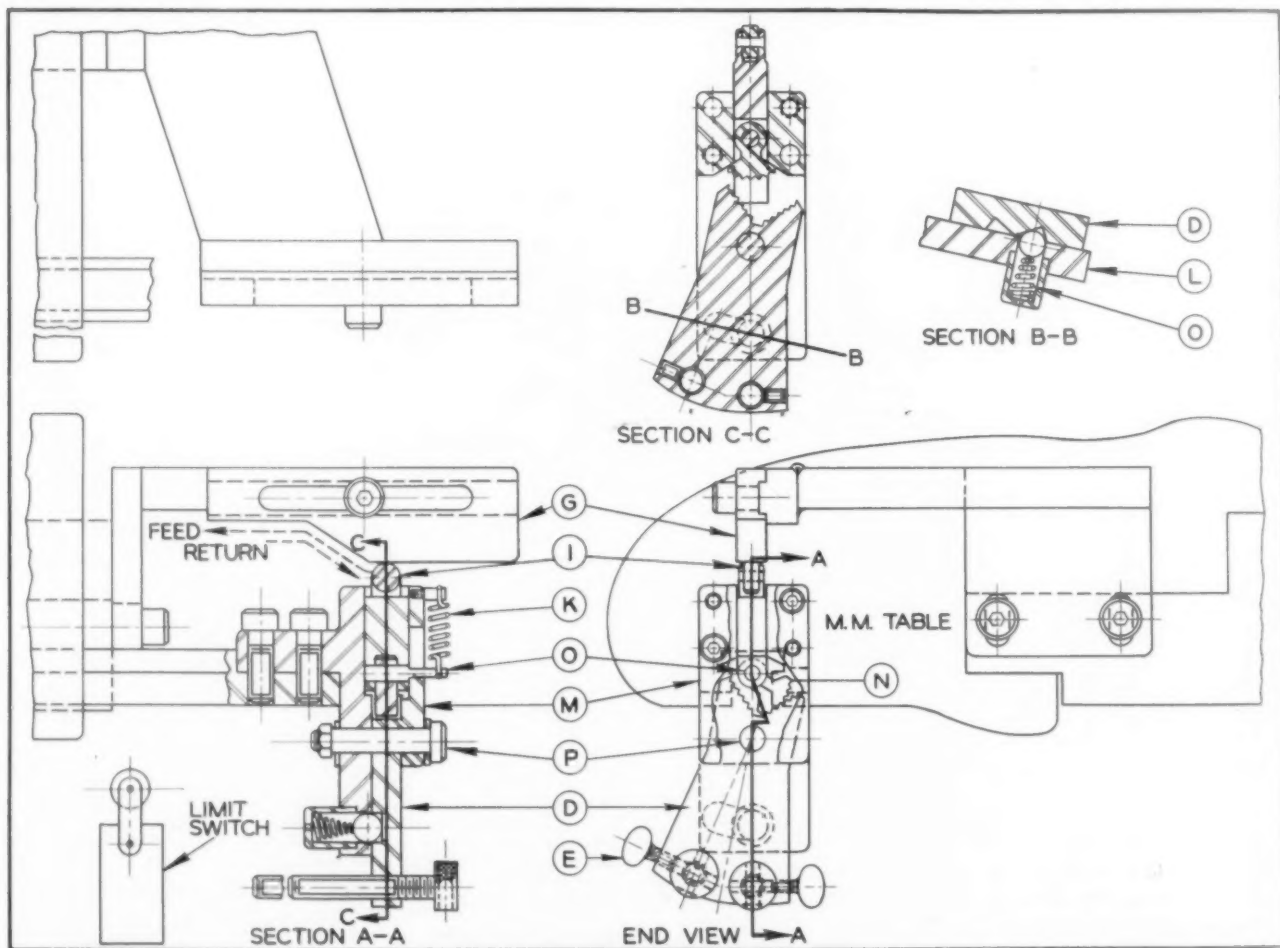


Fig. 2. The 2-position stop, with details of construction and mounting. The "workings" are described in the text.

As the power feed is engaged, the stop arrangement is carried forward by the table allowing the roller cam follower, I, to follow the cam G which allows plunger J to be carried to a raised position—as shown in section C-C—by spring K. The plunger J is retained in slide L by plate M which is secured and dowelled in place.

The plunger J carries a serrated segment—N—in a milled slot which is freely retained by pin O on which it may oscillate. The segment N serves as a stop for plunger J in its raised position, as shown in section C-C, and it is also centered in this position. As the desired depth of the shallow hole is reached, the screw B contacts the limit switch which releases the feed, and the table direction is reversed to return to its initial position.

As the table returns, the cam follower I contacts the cam G and depresses the plunger J. In doing so, the serrated portion of segment N contacts the serrated portions of transfer plate D and causes it to rotate about its axis—pin P—due to the relative form of the serrated position of the transfer plate D, and of the segment N which causes an interference factor between the two resulting in the transfer of plate D to its new position.

In the new position, screw A—which controls the depth of the deeper hole—is in position to actuate the limit switch. The transfer plate D is held in its relative positions by a spring and ball assembly, Q, which drops into suitably machined pockets of the plate D. The deeper pocket is now drilled and, as the table is returned, the sequence of movements of the stop arrangement are repeated, returning screw B to position for the shallower hole.

As shown, this arrangement is mounted vertically. If it were mounted otherwise it would be necessary to provide a thin spring friction washer, between a side of segment N and the milled slot in plunger J, in order to assure the proper mating of the two serrated surfaces of N and D. A production increase of from 25% to 30% has been realized by the use of this attachment for this operation.

E. H. Kinne  
Syracuse Chapter, ASTE

*Readers, members especially, are cordially invited to submit ideas which may suggest short cuts in manufacture or which may be directly appended to some specific tooling problem. The Tool Engineer will pay \$5.00 and up for accepted contributions to our Gadget pages.*

## An Improved Cam Movement

When a cam movement is made by the conventional method there is an offset strain on the cam shaft or fulcrum pin equal to the distance between their centers. As a result of this strain increased pressure is required to move the cam to its operating position. The greater this distance the more pressure will be necessary to rotate the cam; in other words it turns "hard."

Fig. 1 shows a conventional cam movement layout, in which "A" is the cam, "B" the shaft or fulcrum pin, "C" the lever—or part moved by the cam—and "D" the offset distance between the centers of the cam and the shaft. Fig. 2 illustrates an improved design of cam movement and uses the same reference letters and the same initial offset. However, it will be noticed that, with this design, the offset distance "D" has been very much reduced; therefore, the cam can be rotated with less effort on the part of the operator using the movement.

It can readily be seen that this improved design could be used whether the cam is rotated by means of a lever or moved mechanically. This improved design could be used to advantage on movements for jigs and fixtures or where

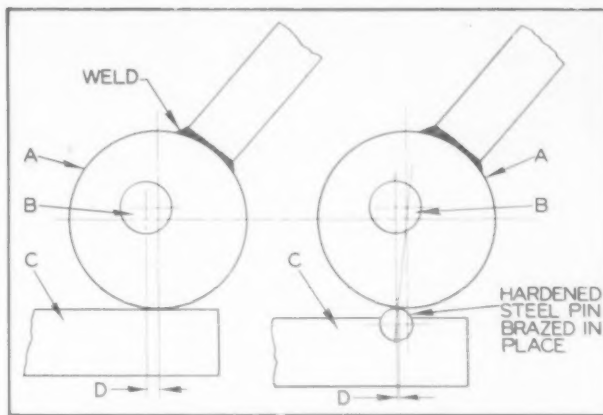


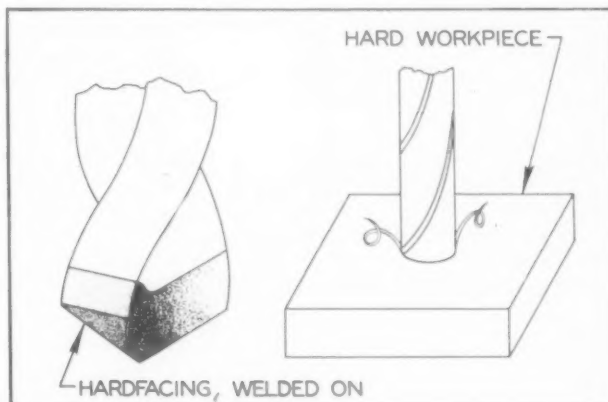
Fig. 1, at left, shows a conventional arrangement. By inserting a hardened pin into the lever, as shown in Fig. 2 at right, the offset "D" will be reduced, with resultant reduction in strain when clamping.

cams of this type are employed in machine tools. It might be added that, while the pin in the lever is shown brazed in place, the pin can also "float," so as to provide creep and thereby distribute wear. In this case, the pin should be held in place by end retainers.

Robert Mawson  
Providence, R. I.

## Emergency "Hard" Drill

Few and far between are the tool and die makers who, on occasion, do not forget to drill an essential hole until after the part is hardened. For that matter, the hole may have been omitted on the drawing, or may be required as a result of engineering changes.



Hard metal can be welded to the end of a drill—preferably of high-speed steel—for drilling hardened materials. The welded-on tip is ground to conform to flute and cutting lip contours.

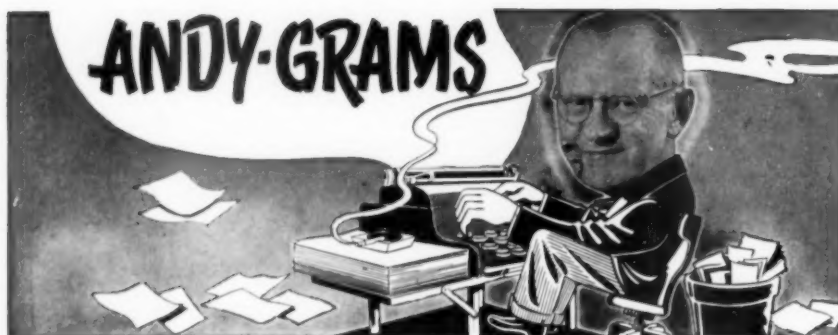
While commercial "hard" drills are available, they may not be stocked in the tool crib, and where time is short a satisfactory drill, for hardened materials, may be quickly made by welding on a tip—say about 1/4 in. long—using Stellite welding rod\*. By welding on a short tip, as illustrated, there will be little trouble in grinding the tip to the general contours of the drill-flute. As an example of efficiency, four holes drilled in a part hardened to 62 Rockwell "C" varied only 0.004 in. from first to last hole.

James Maltby  
Detroit Chapter, ASTE

\*According to a late release, a hard-facing alloy, for application by arc-welding, is also available from Lincoln Electric Company, Cleveland, Ohio. This material is used to tip various tools—chisels, cutting bits, rock drills and twist drills—with hard facing.

The Editors.





As a rule, I'm hard put to think of something interesting to write about—it usually breaks after the copy's gone to the printers—but what with the wrong-way-Corrigan prognostications of the pollsters on the late election, and all that, there should be grist enough for the mill . . . I hope. Speaking of the election, I voted—never mind how—and am therefore privileged to gripe if I don't like what we're going to get. Inversely, I can also boost, thereby helping to foster unity.

At that, I've a lot of admiration for a guy who had to carry the ball more or less alone and who won out regardless. Maybe it pays to get your hair mussed once in a while, eh? Anyway, that's over for another four years, and the thing now is to gracefully accept the (close) verdict of the majority and work together as a team. So, let's slap the grease on the prosperity machine and keep the wheels turning. No sand in the bearings!

From one thing to another, we're beginning to get responses to our appeals for "gadgets" although I'm still waiting to hear from one of our ace gadgeteers whose name I won't mention a/c I don't want to make him conspicuous but he'll know who I mean. How about it, Walter?

Apropos gadgets, a member called up t'other day and wanted an idea for an equalizing clamp and I said we'd run a gadget on one and he said that was "the berries". And next day in comes another along the same line but just different enough to add the spice of variety. Keep 'em rolling, gang!

From a reader who may prefer to remain anonymous, a letter thanking me for the inspiration afforded by the li'l item in November Andygrams, about the guy who was down in the dumps and worrying about making a new start. My correspondent was discouraged, too, but said he pepped right up and is now rarin' to grab the world by the tail and make it howl. Go to it, pal!—the whole world's an oyster to the guy with know-how.

From F. Hanley, Chicago, an acknowledgment of info tendered on cam

design. I had referred him to George L. Detterbeck Company who, he says, "were more than just courteous" and would I mention them for their fine cooperation. With pleasure!—and my personal thanks for helping out.

From A. H. Pettican, So. Africa, Christmas greetings all around and a hint that, a/c "all of Andy's horseshoe pitching friends" maybe I could dig up some desired info. Now look, when I pitch horseshoes I alienate friendships except among the opposition, but maybe we can come across regardless. Also, a letter from Clarence Hamilton of Sheffield Corp'n, apropos which Clarence is due the greater blessings a/c I've received more from that source than I've given.

From Tell Dahllöf, editor of *Industria*, Stockholm, greetings of the Season and a copy of the magazine which contained personal mention from Tell's recent tour through the U.S.A. And from member Bill Sjöstedt, chief tool engineer with Scania-Vabis (Motors), Christmas greetings and a message from Ivar Eklund, chief engineer, to our boys over here myself included. The same to you, Bill and Ek; Glad Jul och Godt Nytt Ar.

Went out to Hoover Tool & Die Company, t'other day, to look over Otto Mueller's latest—gadgét, a hydraulic piercing machine that ought to boost production plenty. Along with that, got a gander of some of H T & D creations that had the spectators all agog. Nice designing, and nice workmanship. While there, met about everybody Who's Who in the local tool and production game, including George Ringstad of Whitman & Barnes and Fred Hebert of Hebert Equipment Co., Romeo, who had contributed the hydraulic power unit to Otto's opus.

While in the neighborhood, dropped in on Colonial Broach Company to tickle Harry Gotberg about an article on broaching and then barged in on V-prex Arvid Lundell to pass the time o' day and, incidentally, to bum some matches. Colonial's really going to town on broaching equipment.

Saturday, Nov. 20, attended a meeting of Pontiac Chapter along with a contingent of Detroiters that included the Chapter officers—Andy Carnegie, Monty Cox, Andy Grant, Gran Sharpe, and Len Kiefel—and in the Nat'l picture, Grant Wilcox, Slim McClellan and Wayne Kay along with prex emeritus Joe Siegel and John Eacock, new office manager at H.Q., all of them complete with their better halves, and Miss Doris Pratt of The Tool Engineer staff.

Sure, there were others—just can't begin to mention 'em all—the occasion being Ladies Night along with a happy inspiration, on the part of the Pontiac Chapter officers, to have joint meetings with other chapters in the Michigan area. Well, they've been doing that in other sections with considerable benefit to all concerned, and certainly we'll be the better for the wider acquaintanceships that result from joint meetings.

At that, I wonder where we'd be without the women and their universal tool? F'rinstance, they were taking pictures of the group and the flashbulbs wouldn't pop until they'd borrowed one of Doris Pratt's hairpins. Then, flash! What you can't do with a hairpin!

For a comparatively small group, Pontiac Chapter has more than its share of outstanding talent and evinces that good fellowship which has been one of the important factors in propagating the ASTE. Personally, I hope that we'll never get so big, or so altogether business-like, that we entirely subordinate this friendliness to other essential activities. Anyway, my congratulations to Chairman Hall and his fellow officers on a fine program and a most enjoyable evening. You'll probably read about the doings in Miss Pratt's ASTE News section later on, so I won't spoil it by further mention here.

Note to Rip Collins: What's that story I hear about 300 Texans all crowded into one airplane? That would be an awful big payload even for this super-duper flying wing, unless the cargo were dehydrated. Ought to make a good news story if we could get the details. I'll be hearing from you, Rip.

Well, Thanksgiving's over at time of writing, and the Holidays will be in the immediate offing by the time this gets to our readers. So now, I wish all you boys North, East, West, South—and girls too—a Merry Christmas and a Happy New Year. May the ties that bind us grow stronger with the passing years.

*Andy*

The Tool Engineer

# Seattle Wins Members at Industrial Show

**T**HROUGH AN ASTE exhibit at the Puget Sound Labor-Industry Exposition in Seattle Civic Auditorium, October 4-10, Seattle Chapter gained 30 new members.

The engineers who applied for membership were among 20,000 visitors attending the seven-day industrial show. Many of these residents of the Northwest made their first acquaintance with the American Society of Tool Engineers, its aims and projects.

The Society booth, considered one of the most attractive in the show, had a blue and gold color scheme and featured photo murals of the 1948 Tool Engineers' Industrial Exposition at Cleveland.

ASTE publications, data sheets, membership information and promotional literature concerning other activities were included in the display.

A moving exhibit of square gears, illuminated with a blue light, was constructed by H. R. Pinkerton, first vice-chairman of Seattle Chapter.

C. A. Peterson, chapter chairman, Mr. Pinkerton, F. L. Coenen, secretary, F. J. Stasny, treasurer, Charles Dreiling, editorial chairman, B. J. Stewart and William Wing, chapter members, and S. F. Girard, national standards committee secretary from the Detroit office, manned the booth and furnished information to visitors.

A poster announced Seattle Chapter's recent achievement in winning a profes-



Seattle chapter officers are ready to welcome visitors to the ASTE booth at the opening of the Puget Sound Labor-Industry Exposition in the Civic Auditorium, October 4. From left: Harold R. Pinkerton, first vice-chairman; Stanley F. Girard (seated), national standards committee secretary from Society headquarters in Detroit; Francis L. Coenen, secretary; Frank J. Stasny, treasurer; Charles Dreiling, editorial chairman; Clyde A. Peterson (seated) chairman; William Wing, chapter member, and Bruce J. Stewart, a member of the chapter editorial committee.

sional tool engineer classification from the License Department of the State of Washington.

By participating in the exposition, the Society cooperated with more than 100

exhibitors to show the industrial products and facilities of the Puget Sound area of Washington. First of its kind in that section, the show occupied 30,000 square feet.

**GIVING A BONUS FOR CHRISTMAS?**  
Here's just the thing for your Society employees—a 4½ per cent ASTE Building Par-

ticipation Certificate. Each December 20, for 10 years or until redemption, the recipient will be paid 4½ per cent interest. Only

Society members can own these certificates. Denominations are \$100, \$500 and \$1000. Mail the coupon below today.



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Please send me complete information on the ASTE 4½ per cent Building Fund Participation Certificates. (See Pages 22-23 for details)

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## Colonel Sees Brazil as Our Future Business Partner

Rockford, Ill.—Brazil will buy more of our goods than we can sell to her. She wants autos from the United States, although oil shortage necessitates converting engines to burn charcoal. She wants electrical goods and equipment, radios, air conditioners, machinery and machine tools. What's more, she can lay cash on the line for them.

This was the bright prospect pictured by retired Infantry Col. A. R. Simpson during an address, October 7, before a dinner meeting of Rockford chapter. In World War II the colonel was assigned to Brazil, and put in 60,000 miles of air travel over a country the size of the United States plus another Texas.

### Wary of Our Motives

But, Colonel Simpson warned, South America is suspicious of the United States. We can't buy her friendship, but we can cultivate it through business. During the war, when European goods were cut off, Brazil came in contact with our service personnel, liked our ways, and sent people here for study and technical training.

High pressure salesmanship doesn't register there. To do business with Brazil, one must speak Portuguese. No one delegates authority. This makes for long involved business transactions, since everything must come from the top. Their friendship is hard to win, but once gained is enduring.

What can Brazil do for us? For one thing, the colonel revealed, she has a mountain of 70 per cent pure iron which could supply the world. Other exports ranking high in world markets include rare woods, rubber, quartz, industrial

diamonds, metals for alloys, sugar, castor oil, cattle, coffee and tea.

In these days of crowded conditions, it is a land of opportunity. Only four per cent of it is under cultivation, yet it can grow any known crop. Most of its 44 million population is found along the coast, but Colonel Simpson believes that Brazil could support 900 million people.

One can live quite comfortably there and maintain four servants for \$50 a month in American money, the speaker observed. A skilled mechanic makes 12½ cents an hour, a teacher \$15 a month, and unskilled labor will work for from five to 20 cents a day. It is a country of great contrasts—very rich and very poor, skyscrapers and jungle.

As an added attraction at the dinner meeting, Joel Jannenga and George Torrence conducted an auction of articles contributed by members. Bids were run up on such miscellaneous items as hair clippers and chandeliers.

## Abrasives and Turning Discussed at Seattle

Seattle, Wash.—N. R. Ekholm, abrasive engineer for the Norton Co., opened the fall season for Seattle Chapter with an informative talk on the manufacture and use of abrasive grinding wheels. Several sound films illustrated his lecture.

Arrangements were made at this meeting to assist in staffing the ASTE booth at the Industry and Labor Exposition in Seattle Civic Auditorium.

"Modern Trends in Turning" was the technical topic for another recent meeting. Fred B. Roth of Monarch Machine Tool Co. was the speaker. Interesting features included air tracer methods of lathe control. Motion pictures augmented his talk.

A large attendance of members and guests expressed interest by the numerous questions they asked.

## Air-Powered Operations Require Less Skill

Madison, Wis.—With air-powered devices machine operations can be so simplified that less skilled labor can be employed than on equipment requiring full manual control and good judgment on the part of the worker.

Speaking before 55 members and guests of Madison chapter, October 11, J. James Mudd, Midwest regional manager, The Bellows Co., cited this and other time- and money-saving applications of "controlled air."

A comprehensive film supplementing his talk detailed these practical adaptations. In some, air power was combined with hydraulic control, giving flexibility with precision. Most frequent uses substituted power for hand motions in highly repetitive operations. In such cases, the operator need only work a push button or lever to effect motions that might require considerable physical effort.

Often, he pointed out, combinations of air and hydraulic control could be more completely developed to include residual parts of the operation, making it more nearly automatic.

## Tigges Engaged to Direct NSRB Tool Planning

Toledo, Ohio—Herbert L. Tigges, vice-president of Baker Bros., Inc., has accepted an assignment as expert to direct the mobilization planning activities of the machine tool section of the National Security Resources Board at Washington, D. C., Chairman Arthur M. Hill has announced.

Mr. Tigges is second vice-president of ASTE and director of the Sales and Service Committee of the National Machine Tool Builders' Association.

He will have charge of continuing contacts with machine tool manufacturers with whom standby contracts were recently placed for the possible initial manufacture of 100,000 machine tools in case of an emergency.

## Boston Lecture Course Scheduled at M.I.T.

Boston, Mass.—The third annual lecture series on tool engineering, to be held at Massachusetts Institute of Technology, Cambridge, has been announced by the Education Committee of Boston chapter.

Prof. Prescott A. Smith, head of the committee and a member of the institute faculty, is in charge and plans the following sessions:

January 20—"Methods and Analysis," a panel discussion.

January 27—"Simple Turning," the engine lathe, contour attachments, and tooling.

February 3—"Turning—Turret Lathes, Automatic Chucking Machines," treating machine cycles and tools.

February 17—"Dies," elementary approach to blanking dies.

February 24—"Threads," single-point chasing, dies, single-point thread milling, multiple-point or hob milling, thread grinding and thread rolling.

The five technical addresses and panel discussions are in addition to regular monthly meetings. Two previous lecture courses, presented at M.I.T. by the chapter, were heavily attended.

Leading New England authorities in their respective subjects will assist in the current series.

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Top, left: Arthur Diamond, former Philadelphia chapter chairman, awards chapter scholarship to Charles E. Fees, as Dr. James Creese, president, Drexel Institute of Technology, congratulates winner. Right: Charles E. Daniels, manager of Du Pont developing engineering, tells Executives' Night audience what science is doing to advance industry, while (below) a discoverer of electrical phenomena listens in the hall bearing his name.

## Management Told Society's Aims at Executives Night

Philadelphia, Pa. — Interest of top management in tool engineering was again demonstrated through the presence of more than 40 representatives at the Executives Night dinner held recently by Philadelphia chapter at Franklin Institute. Over 200 tool engineers attended the function.

Charles E. Daniels, manager of the development engineering div., E. I. du Pont de Nemours & Co., addressed the group on "Industrial Progress Through Research, Development and Engineering."

Requirements for scientific research he listed as selection of project, laboratory facilities, techniques, specialized knowledge, team organization, physical facilities and capital—plus persistent hard work. Benefits include added employment created, new products introduced, and price reductions accomplished.

### Research Tools Aid Engineering

Recent tools of research, stated Mr. Daniels, are opening doors to greater engineering triumphs. He detailed the electron microscope and its work in determining surface character and internal structure of metals. Other devices men-

tioned included a radio-frequency generator for heating materials, an instrument to sample solvent vapors, another to measure mechanical displacement or motions, and automatic recorders and controllers to document processing data.

The electrical resistance strain gage and high speed photography were pointed out also as important new tools for producing the industrial miracles of the future.

### Colleges Need Industry's Support

Halsey F. Owen, national education chairman of ASTE and professor of mechanical engineering at Purdue University, discussed "The College's Outlook on Tool Engineering." Confusion among educational institutions concerning its definition and the school level at which tool engineering should be taught have hindered introduction of courses, said Professor Owen.

Some progressive universities are now offering courses in management engineering, production engineering and industrial engineering, which may be considered a part of tool engineering. Salaries offered will not attract qualified instructors, unless industry endows professorships. With development of a suitable

curricula, Professor Owen believes, industry will lend its support and tool engineering will come into its own.

I. F. Holland, ASTE president, lauded the chapter for its efforts in acquainting local industry with the aims and activities of the Society.

Substituting for P. A. Patterson, scholarship chairman, who was absent through illness, Arthur Diamond, a former chapter chairman, announced the awarding of the chapter's scholarship to Charles E. Fees. Dr. James Creese, president of Drexel Institute of Technology, presented the award to Mr. Fees.

### Introduces Distinguished Guests

During dinner Chairman Samuel R. Boyer, the presiding officer, introduced the following executive guests: E. J. Parker, ACF Brill Motors Co.; W. A. Williams, American Pulley Co.; Adolph Gelpke, Autocar Corp.; J. R. Weaver, Baldwin Locomotive Works; G. M. Muschamp, Brown Instrument Co.; Anthony Marotto, Carey McFall Co.

C. R. Johnson and E. F. Gehret, E. I. du Pont de Nemours & Co.; Louis Milon, Ternstedt Div., Fisher Body Corp.; D. S. Ruben, General Electric Co.; Arnold Landesberg, ITE Circuit Breaker Co.; D. H. Renfrew and R. B. Holmes, Link Belt Co.; J. C. Hess, Leeds & Northrup Co.; E. F. Theis, Philco Corp.; W. T. Gray and Lewis Ibey, R.C.A. Div., Radio Corp. of America.

E. C. Brodin, SKF Industries, Inc.; Horace Winchell, Scott Paper Co.; G. J. Parker, Spicer Mfg. Corp.; Werner Miller, Textile Machine Works; A. F. Porter, Westinghouse Electric Corp.; Lee Williams, Wildman Mfg. Co.; F. A. Vossenberg, Yale & Towne Mfg. Co.; Prof. L. N. Gulick, University of Penna.; Prof. J. S. Moorehouse, Villanova College; J. B. Parks, president, Spring Garden Institute.

### Affiliate Members Receive Pins

L. C. Lane, American Foundrymen's Assoc.; F. B. Foley and W. J. de Mauriac, American Society for Metals; M. C. Randall, American Society of Mechanical Engineers; G. A. Exley, Baltimore chapter; W. H. Lentz, Greater New York chapter; E. H. Sears, Williamsport chapter; and S. F. Girard, standards committee secretary, ASTE.

T. J. Donovan, Jr., national director, presented membership pins to Affiliate Members: J. W. Devey, Stokes Trenton, Inc.; A. E. Donovan, Hill-Chase & Co., Inc.; W. A. Farrell, Bel Far Steel Co.; J. A. Longdon, Longdon Sales Corp.; J. A. Quaid, Martin-Quaid Co.; F. L. Quiring, Royal Tool and Die Mfg. Co.; E. M. Twelves, Carey McFall Co.; Samuel Shapiro, Atlantic Mfg. Co.; and Gustaf Peterson, Edgcomb Steel Co.

### O'Mara, V.P. at Gairing

Detroit, Mich.—Bernard O'Mara, sales manager of Gairing Tool Co., has been named vice-president, Emil Gairing, company head, has announced.

A member of Detroit chapter, ASTE, Mr. O'Mara will continue as sales manager in addition to assuming the duties of his new office.

## Paints Gloomy Picture Of Foreign Trade Outlook

Boston, Mass.—Executives Night at Boston chapter brought out 150 members and guests, November 4, to hear Frederick S. Blackall, Jr., president and treasurer of Taft-Peirce Mfg. Co., Woonsocket, R.I., discuss "An Engineer Views the Current European Scene."

Mr. Blackall gave his impressions of the British Machine Tool Show held in London recently, emphasizing the trend in England toward domestic machines. This trend is fostered by the Ministry of Supply which excludes the importation of U.S. machines and advocates copying our current designs.

"For example," he said, "a Brown & Sharpe wire feed screw machine has been copied so exactly that American parts are interchangeable on it." With English machinists working for 38 cents per hour, 60 per cent of British-made machines earmarked for export, and a low U.S. import tariff of 20 per cent, we may expect serious competition in this field very soon, predicted Mr. Blackall.

### Squeezed Out of European Trade

Western Europe, he warned, is trading heavily with Russia to the exclusion of the United States, leaving no prospect of healthy trade with Europe as anticipated under the Marshall Plan.

Britain leads the world, Mr. Blackall believes, in the design of planers, and are heavy users of optical equipment on their machines. They rely also on tachometers for measuring speeds, feeds, and power consumption.

Concluding that Europe is really "on the dole," the speaker commented, "There is little incentive for production. Manufactures are largely exported. Food supply is limited and of poor quality. The people have an inherent aversion to change. Controls have failed. The only thing holding Britain together is U.S. money."

Speakers' table guests included: Dean William A. White of Northeastern University; G. E. Burens, vice-president of United Carr Fastener Corp.; Joseph F. Eckel, manager, General Electric River Works; Victor H. Ericson, third vice-president of ASTE; Dudley Harmon, executive vice-president of New England Council; Irwin F. Holland, president of ASTE; and Franklin A. Reece, president of Reece Corp.

William W. Young, chapter chairman, was in charge of the program, with Joseph P. Crosby, first vice-chairman, as technical chairman.

## Casting Made Easier

Indianapolis, Ind.—C. E. Herrington of the Meehanite Corp. lectured on castings, November 4, before 68 members of Indianapolis Chapter.

Slides accompanying his talk claimed numerous applications where Meehanite performs the seemingly impossible, even on huge forming dies. A well-produced sound film revealed how this metal bridges the gap between ordinary castings and tool steel, making simple jobs of formerly difficult ones.

## Credits Tool Engineers with Die Casting Progress

Rochester, N. Y.—Evolution of die casting from the first machines made for type casting a century ago, through the introduction of aluminum die casting machines in 1914, to the present predominance of zinc base castings was unfolded by Charles M. Franklin, master mechanic, Rochester Products Div., General Motors Corp., in a talk before Rochester chapter, October 4.

In a breakdown of current die casting production, Mr. Franklin ranked zinc base castings at 75 per cent; aluminum, 15 to 20 per cent; and magnesium, five per cent of total output.

For illustration he showed a sketch of a sample die casting mold operation. Prop-

er gating and venting were stressed as necessary to eliminate porosity.

Tool engineers, the speaker stated, have been responsible for tremendous improvements in die casting machines to meet the demands of product engineers.

At the conclusion of the talk, the members examined a large display of castings. One of particular interest had two cored holes .026" diameter x 1/16" deep, held to .0005" on the diameter.

An enlightening question and answer period completed the program.

E. W. Moore, second vice-chairman, presided in the absence of H. O. Simon, chairman, who was attending the Los Angeles convention.



Photo courtesy Western Machinery and Steel World  
At San Francisco ASM and ASTE members turn the tables on "Prof. I. Q." by asking questions of T. J. Donovan, Jr., ASTE director from Philadelphia, after Mr. Donovan conducted his "Quiz" show at joint meeting of the two organizations. From left: L. P. Martin, membership chairman, Golden Gate chapter, ASTE; G. B. Berlien, ASM chapter chairman and public relations chairman, Golden Gate; Mr. Donovan, Ernest Holden, ASTE chapter chairman; Edward Raves, a former chairman; Frank Wagner, Karl Bues, ASTE director; and T. J. Rohrer, editorial chairman.

## Lucky Silver Pieces Reward Quiz Winners

San Francisco, Calif.—Golden Gate chapter joined with the American Society for Metals in a meeting, October 5, at the Claremont Hotel. B. G. Berlien, chairman of the local ASM chapter and an ASTE member, and Ernest Holden, chairman of Golden Gate Chapter, conducted the meeting. Speaker of the evening was T. J. Donovan, Jr., of Donovan Co., Philadelphia, Pa. He is also a director of ASTE and of the Philadelphia Society of Metals.

As "Professor I.Q." Mr. Donovan conducted his famous "Silver Dollar Quiz" for the 23rd time. The professor asked questions pertaining to tool engineering, mechanical methods and heat treating. Humorous and catchy queries added mirth to the program.

For each correct answer, he awarded a lucky silver dollar in a leather case marked "Winner, Tom Donovan Quiz, ASTE." If the answer was partially right, he presented a half-dollar. A total of 70 prizes were distributed.

Roving among the audience with a microphone, Frank Wagner, also from Philadelphia, assisted Mr. Donovan by spotting persons to be questioned.

## Atomic Power Distant For Consumer Uses

Indianapolis, Ind.—Atomic power will not be available to the layman in the near future to drive automobiles nor to heat homes, according to R. J. Kryter, treasurer of Esterline-Angus Corp.

Well informed through association with atomic research plants, Mr. Kryter gripped 175 Indianapolis members with alternate hope and despair as he unfolded the fantastic possibilities of atomic energy medically, mechanically and militarily. His address highlighted a chapter meeting held October 7 in the Athenaeum.

Terming the missiles which destroyed Hiroshima and Nagasaki "baby bombs," he drew a dark picture of consequences, if present projectiles should fall into enemy hands. Such bombs, he indicated, are hundreds of times more efficient than their prototype.

The lecture included a discussion of super-sensitive instruments, made by the speaker's company and used in discovering microscopic elements contained in the bomb.

H. W. Curfman, first vice-chairman, presided in the absence of C. M. Wetzel, chairman.

## Give Steps in Arriving At Important Decisions

Poughkeepsie, N. Y.—Anyone can develop the ability to make important decisions, Joseph I. Karash, process engineer at Reliance Electric and Engineering Co., Cleveland, Ohio, emphasized while discussing "Reasoning for the Tool Engineer," before a dinner of Mid-Hudson chapter, October 12.

Steps in formulating logical decisions he enumerated as: (1) gathering and analyzing information pertinent to the problem; (2) evaluating; (3) deciding; and (4) explaining your logic to others.

With slides, Mr. Karash illustrated the application of this procedure to drill jig designing. Factors to be analyzed are: the part to be made, the machine and the jig. Complete information should be assembled concerning available equipment and requirements of the job.

With these facts, the speaker continued, it is possible to arrive at: (1) division of work, operations or combination of operations; (2) machine decisions, type and size; (3) tool decision, method of locating and clamping, secondary operation and positioning features, chip control and interchangeability and finally, justification of decision.

To correctly evaluate each step, Mr. Karash urged making a list of things that must be done and another of things that you would like to do. By carefully re-checking the two lists, and combining where feasible, a sound conclusion will result.

Dealing with people, he commented, and making them understand the logic of a decision is often difficult for some designers. This ability also can be developed by understanding your own limitations and handicaps, as well as by developing a sincere liking for other people. True leadership, he concluded, is the ability to create enthusiasm in other people.

William G. Beale, superintendent of the Poughkeepsie Recreation Commission, gave a coffee talk on the commission's activities.

## Cites Methods Economies

Williamsport, Pa. — "Methods Time Measurement—A New Tool for Tool Designing," as presented by John L. Schwab, division manager, Methods Engineering Council, New England Div., Bridgeport, Conn., highlighted a meeting of Williamsport Chapter, held October 11 in the Lycoming Hotel.

In discussing findings of results obtained through an elementary course in tool design, Mr. Schwab cited one company as saving \$554,000 by giving this 20-week course. To put across a new idea, he added, one must first present benefits, then facts.

Paul Hively, sales manager, Lowry Electric Co., preceded Mr. Schwab, as coffee speaker. Salesmanship, he told the group, can be very effective in tool engineering, if it is used constantly.

A membership drive was initiated during the meeting. Attendance was 25.



Prominent figures at November dinner meeting of Madison chapter, standing, from left: Werner Schaeff, treas.; J. L. Piekariski, secy.; W. R. Carnes, 2nd v.-chm.; Vern McFair, 1st v.-chm.; A. M. Lane, speaker, of Vickers, Inc.; L. A. Leifer, chm.; Pierce Barker and Peter Kelly of Vickers; and J. P. Schommer, Fond du Lac chapter head

## Composite Hydraulic Circuits Run Transfer Machines

Madison, Wis.—Problems encountered in joining individual hydraulic circuits into single composite circuits to operate multi-station transfer machines were explained to Madison chapter members, November 2, by A. M. Lane, Rockford district manager for Vickers, Inc.

Two nine-station machines incorporating a variety of machining operations were shown in slides. These machines form the main section in the line processing the V-8 cylinder block of a new Kettering engine to power the 1949 Oldsmobile.

Mr. Lane's illustrations included drawings of composite hydraulic circuits for each machine, details of individual circuits arranged to perform unusual functions, as well as internal construction

views of special and standard valves involved.

The speaker was assisted by Pierce Barker, application engineer from his office.

Prior to the dinner and meeting, the group enjoyed a Wisconsin Conservation Commission color film, entitled "Protectors of the Outdoors." It depicted the work of state fish and game wardens in protecting wild life.

## Sims Stresses Factors Vital to Good Welding

Kansas City, Mo.—Howard Sims, chief metallurgist, Black, Sivalls & Bryson, Inc., stressed soundness of weld as an important factor in good welding, before the October 6 meeting of Kansas City chapter, held at the Advertising and Sales Executives Club.

With slides, Mr. Sims pointed out the change of grain growth in the heat affected area. Grain growth in the weld is affected by heat input. Preheat is increasingly important as plate thickness increases. Hardenability is affected considerably by addition of chromium and nickel, the pictures showed.

James B. Ramsey and W. Poston, chief engineer, and assistant chief engineer and superintendent, respectively, of the Kansas City Water Department, presented the film, "Life Stream."

The motion picture outlined the process used in clarifying and purifying river water before it goes through the mains to the consumer. As a precaution, it was pointed out, samples of water are taken at various points in the water system for rechecking.

In the discussion following the film, Mr. Ramsey stated that large water mains are designed to withstand 600 lb. psi. Effect of water temperature on precipitation of solids in water pipes in the home was explained by Mr. Poston. Precipitation was said to be negligible up to a temperature of 160 deg. F.

Forty members and guests attended the dinner meeting.

## Weingard Elected to Fill Vacant Vice-Chairmanship

Erie, Pa.—November meeting of Erie chapter was held on the 2nd at General Electric Community Center. Thirty-seven members and guests attended the dinner and technical session.

In the absence of Chairman Vincent Peck, Gleason Starn, second vice-chairman, opened the meeting with a special election to fill the office of first vice-chairman. Linn Kern, the former incumbent, was recently transferred to Cincinnati by his employer. Past Chairman Harold Hagle conducted the balloting.

A. E. Weingard was elected to succeed Mr. Kern and M. H. Hetzel, a former chairman, administered the oath of office.

Guest speaker was Kenneth N. Macomber, chief engineer of Lapointe Machine Tool Co., Hudson, Mass. He lectured on surface broaching, illustrating with two films. Samples of broached products shown in the film were displayed.

Guests introduced by Mr. Starn included: William Campbell, D. Bartlett, K. Cooper, E. Green, T. McCartney, A. Divell, F. Keefer, T. Pasick, and J. Decko.



## Vogt Demonstrates Glass As New Industrial Tool

Springfield, Vt.—A piece of plate glass,  $\frac{1}{4}$ " thick, supported only at the ends, will sustain the weight of a man, Harold G. Vogt of the Corning Glass Works, Corning, N. Y., demonstrated for Twin States members.

Mr. Vogt, a former instructor in physics at Harvard, conducted this and other demonstrations to illustrate an address, "Glass Comes of Age," given before a chapter meeting October 13.

To prove the extreme strength of certain types of glass, he hammered a spike into a plank, with a piece of kitchen ware. As an example of high resistance to heat shock, ice was melted on a piece of electrically heated glass.

Speaking before 60 members and guests assembled in the Trade Winds cafe, Mr. Vogt traced the history of glass from its early beginning as an art more than 5000 years ago to its present status as an exact and complex science.

### Adopted by Industry

He explained the effect of various chemical and physical treatments and illustrated with piping, radio tube envelopes, machinist gages, fibers, bearings, building blocks, a centrifugal pump, springs and germicidal lamps, all made of glass.

Possibilities of the widespread industrial use of glass have only just begun to be realized by industry, Mr. Vogt emphasized in conclusion.

William Hadfield, Chapter chairman, introduced the speaker and presided over the meeting. Guests included D. E. Gilbert of Northern New Jersey Chapter, who is associated with L. S. Starrett Co.; L. G. Rollins and F. B. Engle of Joy Mfg. Co., Claremont, N. H.; and Messrs. Joseph and Francis Champaux of Laconia, N. H., who have applied for membership in the Chapter.

Other recent applicants are: W. F. Sinawski, M. F. Dowhan, A. S. Childs and C. W. Quimby of Jones & Lamson Machine Co.; Paul Gates of Fellows Gear Shaper Co.; R. E. Brown and M. E. Wilson of Cone Automatic Machine Co., Windsor, Vt.; and A. P. Bureau of Tri-State Industrial Co., Manchester, N. H.

## Entertainment and Prizes Make Gay Dinner Dance

Minneapolis, Minn. — Annual dinner dance of Twin Cities Chapter took place recently at Columbia Chalet. Walter F. Sahlin and a staff of able assistants were in charge of the gala occasion.

The evening began with dinner, followed by a brief welcoming address by Chairman Harold D. Sullivan, and introduction of guests.

After distribution of 39 prizes, the party got into full swing to the tune of Gordie Bowen's orchestra. An interesting floor show was presented by the "Great Roy and Madame Helene" ensemble.

Each lady received a beautiful corsage with the compliments of the chapter.



New types of glass for industrial uses are inspected by group attending Twin States chapter meeting, after lecture by H. G. Vogt of Corning Glass Works. From left: E. M. Brown, Jones & Lamson Machine Co.; A. P. Bureau, Tri-State Industrial Co.; J. T. Wilson, Carborundum Co.; George Goodhue, Fellows Gear Shaper Co.; C. Ranney, Jones & Lamson; B. W. Harriman, Fellows

## Ingenious Machines Seen Processing Metal Chairs

Wichita, Kans.—Members of Wichita Chapter saw how personal aircraft, hydraulic equipment for farm machinery and metal furniture for the United States Army are made, in a guided tour of Cessna Aircraft Co., October 13.

First stop on the tour was to watch semi-automatic, Heli-arc machines welding chair legs. These machines are tooled by the Cessna Tool Engineering Department. From there the men went through a modern, well-equipped machine shop, one of the largest in the Southwest.

In the metal working shop a large variety of punch presses and hydro-presses were in operation with some nice dies in operation. The assembly line, an ingenious but simple application of the mechanized conveyor line, is adaptable to three plane models. This flexibility is very essential in the aircraft industry.

Conveyor lines for automatic painting of metal furniture came next. These are the latest type and very efficient. In conjunction with the paint line, equipment for artificially graining metal chairs revealed a process new to most of the engineers. Designed and built by the company, the graining machines are something of an achievement, considering the irregular shape of a formed chair leg.

The tour concluded with an inspection of the final assembly department where personal aircraft is readied for the customer.

Ninety members and guests participated in the enjoyable educational tour, arranged and directed by William Grabendike, first vice-chairman of the Chapter and manufacturing engineer for Cessna.

## Aluminum Development Opens New Markets

Toronto, Ont.—Through recent developments in the use of aluminum, new peacetime markets have opened up, boosting Canada's production of this material to six times that of the best pre-war years.

Before World War II, said John K. E. Cox, Manager of the Toronto Division, Sales Development Dept., Aluminum Co. of Canada, addressing Toronto members October 6, aluminum was used primarily in kitchen utensils. Now it is being made into lifeboats, locomotive cabins, buses, truck bodies, window frames and large preformed sheets for building facings. As new processing equipment becomes available for making structural shapes, aluminum applications will be broadened.

It can be strengthened, Mr. Cox pointed out, by alloying it with other metals, giving lightness, sturdiness and corrosion resistance. Alloys of aluminum are also acid resistant. This makes them suitable for tank cars and paper mill rolls. Through the Argon gas arc-welding process, it is now possible to do production welding on aluminum.

Mr. Cox illustrated his talk with charts showing physical properties of aluminum alloys.

Prior to the meeting in the Oak Room of the Union Station, dinner was served to 58 members. An additional 42 attended the technical session.

## Superfinish Produces Smooth, Cool Surface

Pittsburgh, Pa.—Superfinish changes a surface produced by conventional means from a non-uniform jagged area to smooth, undisturbed crystalline metal. By removing points and projections above the bearing or contact surface, it tends to prevent the rupture of oil films under pressure. This permits greatly increased bearing loads without metal-to-metal contacts.

Addressing 65 Pittsburgh chapter members, October 8, Walter M. Nielsen, Superfinish engineer of Gisholt Machine Co., Madison, Wis., explained the process explicitly.

This method, he stated, does not develop heat or excessive pressure over any region. Speed is another advantage, as a fine surface capable of heavy duty load carrying capacity can be produced in any desired degree of smoothness within seconds.

Mr. Nielsen's presentation was based on slides visually describing the process. Among these were pictures of attachments for adapting regular engine lathes and millers for Superfinishing. Slide films also were shown of Superfinishing machines built by Gisholt.

W. S. Risser, chapter chairman, opened the meeting and conducted a brief business meeting. Frank Boyd, first vice-chairman, introduced the speaker and presided during the technical program.

## Education Chairman Cites Professional Progress

Hartford, Conn.—Eighth annual education meeting of Hartford chapter featured Halsey F. Owen, associate professor of industrial engineering, Purdue University and national education chairman, ASTE. Approximately 125 members and guests attended the dinner meeting at Trinity College, October 4.

In his address Professor Owen related the evolution of tool engineering, professional problems, progress in advancing the profession in educational circles, and prospects for the future. He concluded with a strong appeal for chapter cooperation in promoting the Society's educational program.

Extreme interest of the audience was evident in the many questions asked from the floor at the conclusion of his talk.

### Published in Tool Engineer

Professor Owen's paper appeared in substance in the November *Tool Engineer*, under the title, "What Is Tool Engineering?"

Earlier in the evening Prof. Harold J. Lockwood, of Trinity College engineering dept., described the training of naval engineers, now majoring at Rensselaer Polytechnic Institute.

I. F. Holland, Society president, reported on activities of other chapters, and introduced Professor Owen.

Guests included Albert M. Jorgensen, president, University of Connecticut; Alan S. Wilson, president, Hillyer College; C. S. Greco, supervisor, Connecticut Engineering Institute; and Marc A. Porter, owner, Porter School of Tool and Machine Design.

Visiting members from Boston were: Prof. Prescott A. Smith of the National Education Committee, W. W. Young, Boston chapter chairman; and A. A. Nichols of the National Program Committee.

## Coated Abrasives Plant Host to Twin Cities

Minneapolis, Minn. — Through the courtesy of Minnesota Mining & Mfg. Co., Twin Cities Chapter held a dinner meeting at the company's plant in St. Paul, followed by a tour of the factory.

After dinner in the cafeteria, James E. Trask, Divisional Engineer in charge of coated abrasives, spoke concerning the growth and development of special processes and the design and construction of special machinery used in making the firm's products. Mr. Trask, aided by several other company engineers, then conducted the entire group through the plant.

The process of making coated abrasive products was observed from beginning to end. Such operations as crushing the abrasive material, grading, sifting, heat treating, and applying abrasive particles to paper or cloth the visitors found extremely interesting. Equally fascinating was the manufacture of belts, discs and other finished tools.

## Metal Working Viewed In Farm Machinery Plant

Richmond, Ind.—International Harvester Co. held open house to Richmond Chapter, October 12.

Metal spinning operations on cream separator production highlighted the plant tour. Another point of exceptional interest was the deep drawing of stainless steel.

Following the tour, refreshments were served. A unique and entertaining treatise on farm and home safety was presented in the film, "Paradise Valley."

George Cottrell, Works Manager, and Leslie Court, a member of the Chapter and of the International Staff, arranged for the tour.

Attendance included members of Muncie Chapter.

A. G. Bryant, center, retiring president of the National Machine Tool Builders' Association, is dinner guest and speaker at Fond du Lac chapter's "Bosses Night." At left and right are: J. P. Schommer, chapter chairman; and W. J. Kohler, Jr., president of Vollrath Co., Sheboygan, and toastmaster at meeting.



Joseph Waltman, secretary of Evansville chapter and process engineer at the local International Harvester plant, points out features of a milk cooler to a group of Society members making an inspection tour of the plant.

## Favors Surface Broaching For High Production Jobs

Elmira, N. Y.—Kenneth N. Macomber, chief engineer at Lapointe Machine Tool Co., Hudson, N. Y., discussed surface broaching before a group of Elmira chapter members meeting October 4 in the Mark Twain Hotel.

Films accompanying his talk included the broaching of blade slots for compressor rotors of jet propulsion engines.

Surface broaching, Mr. Macomber stressed, requires extensive engineering and machinery, but pays dividends on high producing projects.

James F. Deegan, chairman, presided, and Patrick G. Pecorara, program chairman, introduced the speaker.

## Europe Fritters U. S. Aid Needs Machines and Tools

Fond du Lac, Wis.—Since Marshall Plan countries tend to spend practically all of the American aid on immediate needs, without thought of ultimate recovery, the United States may have to budget the expenditure of these funds, in the opinion of A. G. Bryant, retiring president, National Machine Tool Builders' Association.

Relating his impressions of a recent business trip to Europe, Mr. Bryant, who is also vice-president of the Cleerehan Machine Tool Co., Chicago, Ill., stated that production is Europe's only hope of recovery and production is possible only with proper machinery. He was addressing 150 members and industrial executives at Fond du Lac Chapter's "Bosses Night," held October 8 at the Hotel Beaumont in Green Bay.

If farms were mechanized, he continued, thousands of acres now growing fodder could produce food for human consumption. Given more efficient machinery, the critically short labor supply could produce more manufactured goods.

But machine tools are needed to build machinery. With private industry in the United States absorbing large wartime surpluses of government tools, the American machine tool industry is running at about one-half capacity. Here is one field, Mr. Bryant brought home, where this country could export freely without upsetting its economy.

Walter J. Kohler, Jr., president of the Vollrath Co., Sheboygan, introduced Mr. Bryant. Jule P. Schommer, Chapter chairman, presided at the meeting.

## Ardussi Buys Plant

Cleveland, Ohio—Wallace F. Ardussi, sales and engineering executive, has purchased the Variety Machine & Stamping Co., Cleveland. The company has been operating for 27 years as a high production manufacturer of metal stampings, assemblies, tools and dies.

Manufacturing facilities are available for a broad variety of sheet metal dies and stampings, with presses up to 350 tons capacity. A completely equipped, modern tool room is included.

Mr. Ardussi received his engineering training at the University of Michigan. He resigned as vice-president in charge of sales and engineering for Hupp Corp., Cleveland, to enter private business.

He is a member of the Cleveland ASTE chapter, SAE and ASM.

## Tour Refrigerator Plant

Evansville, Ind.—Mark Keeler, works manager of International Harvester Refrigeration Division, welcomed approximately 100 members and visitors of Evansville chapter to a recent dinner meeting at the Evansville plant.

Following Mr. Keeler's address, Frank Hausfeld, assistant to the works manager, and a past chairman of the chapter, conducted the group through the plant.

Manufacturing operations viewed included the production of household refrigerators, milk coolers, deep freeze units and cotton picker drum assemblies.

## Miracles of Science Awe Chicago Engineers

Chicago, Ill.—The wonders of modern science were demonstrated to Chicago chapter members in a dramatic stage presentation, given November 1 by General Motors Corp.

Before the eyes of 250 tool engineers, attendants of the "Previews of Progress" fried eggs on a cold stove, with a newspaper between the pan and the high frequency current.

A pinpoint arc of light, one-fifth the brilliance of the sun, was used to transmit sound. Intensity of the light was varied as it focused on a photo electric cell. The cell generated electricity which was amplified to produce music.

In contrast "Mary Had a Little Lamb" was recorded on a piece of lead foil with a duplicate of Edison's early phonograph.

### Today's Lighting Still Inefficient

The electrical wizard's first light bulb burned dimly in comparison with a fluorescent lamp. Fluorescent powders and cloth glowed under ultra-violet light. A 1000-watt mercury vapor lamp,  $\frac{1}{8}$ " in diameter and 2" long, shone through a coaxial water jacket.

But the best light exhibited is only 40 per cent efficient, leaving room for vast improvement in today's lighting.

How the petroleum industry outwitted the enemy after Japan seized 90 per cent of the world's rubber supply in the Far East was revealed in another demonstration. Gas, liquified to -140 deg F and combined with chemicals, set off a mild explosion in the process of becoming butyl rubber.

The show closed with a message that America owes its greatness to freedom—for here there is no ceiling on imagination.

## Erie Honors Ladies

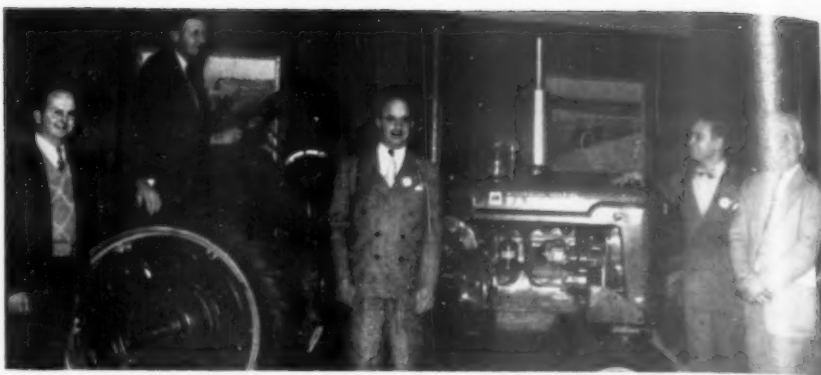
Erie, Pa.—Annual ladies night dinner of Erie chapter was held October 5 at Hotel Summit, with 55 members and guests participating. Gardenia favors were presented to the ladies.

After dinner Chairman Vincent Peck introduced the speaker, Joseph A. Kazamek of Behrend Center, Penn State Extension. Mr. Kazamek's topic, "Square Pegs in Round Holes," concerned vocational guidance in helping an individual to select the proper school course and the most suitable calling.

Dancing to the music of Toni Conti and ensemble followed the speaking program. Walter Cebelinski was in charge of the enjoyable social function.

## On Awards Committee

Chicago, Ill.—Carl E. Schmitz, Vice-President and Director of Engineering at Crane Packing Co., and a Chicago Chapter ASTE member, has been appointed to the Annual Awards Committee of the American Society of Lubrication Engineers.



During a chapter tour of the local International Harvester plant, Louisville officers inspect a Farmall tractor. From left: John A. Black, chairman; Gerald A. Egan (seated at wheel), second vice-chairman; W. David Wuest, treasurer; Louis G. Gutermuth, Jr., secretary; and Norwood H. Booker, first vice-chairman of the chapter.

## Louisville Engineers See Tractors Roll Off Lines

Louisville, Ky.—Tractor production was demonstrated to 129 Louisville members and guests participating in a chapter tour of the local International Harvester plant, October 13.

Starting at the tool grinding, tool and forging die departments, the group observed the latest equipment and methods for precision tool work. In the forging department axles, gears and shafts were being formed and heat treated. Long lines of gear cutters and special design machines were passed on the way to the engine building with its multi-spindle machines.

Here engine parts rolled off the lines with clockwork precision. The completed motors go to the motor test building, then to the final assembly line. Fenders, hoods and small light gauge parts are turned out by the sheet metal department.

Next stop was the final assembly line. There the visitors followed sub-assemblies through to the finished product.

Dinner in the plant cafeteria and an address by Paul Johnson, works manager, preceded the tour. N. H. Booker, first vice-chairman of the chapter and chief tool designer for Harvester, arranged for the tour.

## Situations Wanted

**ASSISTANT PRODUCTION MANAGER**, with eight years' experience in mechanical design, tool design, methods engineering, and cost estimating, desires change. Available immediately. Prefers small company. Locale no question, providing salary is adequate. Address replies to Box 154, American Society of Tool Engineers, 10700 Puritan Ave., Detroit 21, Mich.

**SALES ENGINEER** with three and a half years' field sales in fabricated and welded parts, stampings, general machining and fabrication. General background in shop practice and tool design, cost estimating, sales promotion. Please write to Box 155, American Society of Tool Engineers, 10700 Puritan Ave., Detroit 21, Mich.

## Rocket Engines Develop 32 Horsepower per Pound

Boston, Mass.—Using the ram jet engine for propulsion, current models of rockets are traveling at 1400 mph. To do this they develop one hp for each half-ounce of engine weight.

Their accuracy, said Dr. Albert C. Hall, is now well within the radius of the explosion set off by a proximity fuse. Such missiles are easily adapted to atomic materials. Dr. Hall, director of the dynamic analysis and control laboratory and associate professor of electrical engineering, Massachusetts Institute of Technology, made these revelations, October 14, before a meeting of Boston chapter in New England Mutual Hall.

He explained in detail the relationship between research and production, then compared guided missiles used in the last war with projects and aims of current programs for developing these weapons. Dr. Hall is considered an outstanding authority in this field.

A. J. Snyder, vice-president and works manager of Morse Twist Drill Co., New Bedford, lectured on "Small Hole Drilling and Tapping."

Materials used in drill manufacture, such as 18-4-1 high speed steel and cobalt steel, were discussed and their advantages compared. Cobalt drills were shown to be superior to high speed steel drills for many applications, while bronze drills are used primarily in explosives industries, to prevent sparks.

W. W. Young, chapter chairman, presided, assisted by Henry Hudson of Vanadium-Alloys Steel Co., as technical chairman. Approximately 240 members and guests were present.

## Gives Heat Treat Talk

Fond du Lac, Wis.—Allan G. Shepherd, chief tool engineer at Taft-Peirce Mfg. Co., Woonsocket, R. I., addressed approximately 125 members and guests of Fond du Lac chapter in a recent meeting at Reif's Mills, Manitowoc. His subject was "Heat Treatment and Its Relationship to Tool Design."

Mr. Shepherd detailed the proper selection of tool steels, from a designer's standpoint, and considerations in heat treatment. He pointed out the value of practical experience in work of this type.





Photo courtesy Western Machinery and Steel World

Good fellowship prevails around this dinner table at a recent meeting of Los Angeles chapter. On the left are: Louis Reid, Ernest Danielson, Albert Tetzlaff, Louis Nanchy and Anthony Greenfield. Seated at the right: Edward L. Boersig, Jr., Gordon Cleveland, George Murrell, Lawrence E. Biggie, Don C. Miller and Ralph H. Chapman

## Tool Standardizing Cuts Blanks from 4000 to 200

South Bend, Ind.—Through a cutting tool standardization policy, one company has reduced its carbide tool blanks from an average of 4000 to about 200.

This number is now sufficient to service the more than 6500 machines, largely hand and automatic screw machines, used in the Caterpillar Tractor plant. In the past, O. O. Gammon, chief tool designer for Caterpillar, told South Bend members recently, all tools were considered in terms of the parts on which they were used. When a part was changed or discontinued, the tools were a total loss.

Under the new method, all tools on hand for each machine are described in a machine tool folder. Thus, they may be used on more than one job.

The same simplification program has been carried into gang punches. Punches and die buttons are now carried in stock according to size, and thickness of the metal on which they are used. This permits more accurate holes with less burring and tearing. When punches are ground for sharpening, the tool room supplies shims to compensate for the metal removed.

L. J. Ely, factory manager of the Caterpillar Diesel Engine plant, discussed several new machines built by the Caterpillar Co. for special jobs.

## Cranes Demonstrated In Harnischfeger Tour

Milwaukee, Wis.—October meeting of Milwaukee chapter was held on the 14th at the Harnischfeger Corp.

Chairman Joseph Ebner welcomed the group of 150 members, conducted a brief business session, and turned the meeting over to Program Chairman Arthur Gudert.

After dinner Mr. Gudert introduced Elmer Krueger, chief city planner, who outlined Milwaukee's plans for the future.

Following a showing of slides illustrating welded construction in tooling, the party was escorted through the Harnischfeger plant. Adding interest to the tour were demonstrations of the company's overhead cranes, along with other displays.

## Ingot Size Control Saves Steel Maker \$175,000

Chicago, Ill.—Savings of \$175,000 annually, through control of ingot size alone, are being effected by Republic Steel Corp., according to Wade R. Weaver, metallurgical engineer and chairman of steel conservation and quality committee for this company.

Addressing approximately 150 members of Chicago chapter, ASTE, and the Chicago section of the American Society for Quality Control, October 4, Mr. Weaver cited other economies achieved by his firm through application of quality control.

Losses on ingot cutting have been reduced from 2 per cent to 0.4 per cent. Control charts shown, indicating 83 per cent overweight on steel coatings, have been used to develop an average coating. This means a saving of \$1,800 per month.

Variation in weight of ingots has been cut from 200 lb. to 83 lb. Ingot weight is now established at 5300 lb., an average drop of 134 lb. Some of this improvement, Mr. Weaver commented, has resulted from closer control of the mold size.

In explaining the initiation of a quality control program to increase production, improve quality and lower costs, Mr. Weaver stressed that management is dependent on foremen to actually put across such a project. A bonus plan, he feels, should be instituted as an incentive for foremen to submit ideas, while the industrial engineering department should establish standards for foremen.

Harold Taylor, chairman of the ASTE group, presided.

## Measuring by Light Waves

Evansville, Ind.—Adam Gabriel, vice president in charge of production and engineering, Acme Industrial Co., Chicago, Ill., was principal speaker at the October 12 meeting of Evansville chapter.

"Precision Measurement by Light Waves" was the subject Mr. Gabriel presented to the large group of members attending this meeting in the Science Building of Evansville College.

Clyde Yost, chapter chairman, presided, assisted by Roy Ackerman, program chairman, who introduced the speaker.

## Carbides Find New Uses As Boring Bars, Bearings

Toledo, Ohio—From J. S. Gillespie, acting manager of tool sales engineering for Carboloy Co., Detroit, Mich., Toledo members learned "What the 1948 Model Tool Engineer Should Know About Carbides," at a recent meeting in the Toledo Yacht Club.

Mr. Gillespie began by explaining the composition, processing, characteristics and advantages of Carboloy. Only silicon carbide and diamond exceed tungsten carbide in hardness, he claimed.

High red-hardness, wear resistance, low coefficient of friction, density, and high modulus of elasticity were named as important qualities.

## Increases Production

Emphasizing that the greatest field for tungsten carbide is in tooling, the speaker cited an example where one plant doubled its production through properly engineered and controlled carbide tools. Though this was admittedly an unusual instance, amazing gains may be achieved. Mr. Gillespie stressed, by intelligent study of the problem at hand with a view to using carbide to its maximum possibility.

He showed how tungsten carbide rods of various cross-sections clamped in standard or special shanks could be used to greatly increase the number of pieces per grind where applicable. Improper brazing or poor grinding procedure often cause carbide failure.

Among new applications mentioned were boring bars of solid carbide, bearings, and burrs rotated at high speed to replace a grinding operation on a small hole.

Mr. Gillespie also presented a film showing recent advances and future expectations of carbides. Slides illustrated all phases of his talk.

A color film taken at the annual summer golf frolic at Highland Meadows also was shown.

## Metallurgist Lectures On Tool Steel Castings

New Haven, Conn.—C. D. Preusch of Crucible Steel Co. gave the principal address at a meeting of New Haven Chapter, held October 14 in Dunham Laboratory of Yale University.

His subject, "Tool Steel Castings," embraced types of steel used in precision casting and methods employed both in this and in sand casting.

Upon concluding his formal talk, Mr. Gillespie, assisted by Fred Dawless, technical chairman, conducted a discussion period, capably answering all questions.

Mr. Dawless, who is national membership chairman, reported his committee's plans for building membership. John Kulawiz, chapter membership chairman, appealed to the group for assistance in bringing in new members.

Alton V. Pollard, chairman, presided, and F. W. Gilbert, program chairman, announced coming attractions for the current season.

## New Tools Obsolete Wartime Equipment

Toledo, Ohio—Machine tools built prior to 1945 have become uneconomical by reason of the great strides made in this field since then, according to S. E. Beer, special sales representative of the Monarch Machine Tool Co. Mr. Beer addressed Toledo Chapter October 13 concerning "New Developments in Turning Equipment."

Citing the high investment value of machine tools, he pointed out that a normal investment expectancy is four to six per cent per year, whereas it is quite possible to amortize a machine tool in one year.

Tool engineers, he stressed, are an important link between management and profit through machine tool application.

Out of the present highly competitive machine tool market have come sound engineering features. His own company, the speaker said, is now offering air gaging in competition with hydraulic and electronic controls, with as few as six gears from motor to spindle, leaving 90 per cent of the motor efficiency available for turning.

A film illustrated an air gage tracer reproducing with a single-point tool any desired contour formed in a thin metal template, including steps, shoulders and tapers. Only limitation is the grinding of a suitable tool.

Another motion picture depicted a Shapemaster lathe turning, boring and facing extremely difficult jobs. This machine was fitted with a cam-controlled cross-feed while a Keller control was used for longitudinal contour. Most of the work shown was for glass and plastic molds. Scalloped diameters bored on holes of curved contour and turning of squares were accomplished with ease. Facing cuts of highly complex designs were also performed.

Mr. Beer was accompanied by John Wisener of the Monarch Cleveland office.

## Hydraulics Development Paces Industrial Progress

Baltimore, Md.—"Basic and Advanced Hydraulics" was presented to Baltimore chapter, October 6, by A. G. Winchester of the laboratory and development dept., Gerotor-May Corp.

After tracing the gradual application and development of hydraulics and principles involved, Mr. Winchester discussed industrial advancement in terms of tool engineering, from the first use of hydraulics in machinery and tools to complex multiple and sequence applications.

During the lecture each member of the audience received a set of blueprints to assist him in following technical points.

Mr. Winchester's address was the premiere presentation of an original paper.

Coffee speaker was T. L. Miller, personnel director of the Baltimore Police Department. He described methods used to increase the department's efficiency and plans for further improvement.

About 150 members and guests attended the meeting.



Hamilton members turn out in force for program on aluminum processing, presented by John W. Lengbridge of Aluminum Goods, Ltd., and chairman of Toronto chapter. George Gilmore, first vice-chairman, conducts the meeting.

## Management Methods Make Tool Room More Efficient

Montreal, Que.—"Small tool rooms, as well as large, can benefit from modern management and production methods," said George S. Clarke, speaker at the October 14 meeting of Montreal chapter, held at Canadian Legion Memorial Hall.

Mr. Clarke, who is chapter chairman, and assistant superintendent in charge of tool room and machine shops at the Telephone Division of Northern Electric Co., Ltd., was discussing "Tool Room Management."

The tool maker, he observed, practices a highly skilled craft and is usually the highest paid hourly worker. Therefore his time must be used to advantage—not on work which could be handled by less skilled workers.

Formerly the toolmaker designed tools, studying parts to be made, then performed all the tool-making operations by tedious hand work. Now, the tool designer is a specialist in his field, with technical data available on all factors to be considered.

### Checked by All Departments

All departments concerned approve the tool drawing before it is sent to the tool room. This eliminates the possibility that the tool might be too costly to make in the plant shop and gives opportunity to include features for making the tool more efficient.

Detail parts, he explained, should be tagged and numbered as rough cut. If heat treating is required, the part should be painted with the code color for that type of steel. When all sides are machined, a code number should be stamped on a face where it will show after all operations are completed. This gives a permanent identification of material for the heat treat man.

The toolmaker should attach machining instructions when he lays out the parts. Colored lights or flags could signal that the parts are ready to be moved to the machines.

Machines should be operated by apprentice toolmakers. Parts are then returned to the toolmaker or taken to the heat treat department by a porter.

In conclusion he warned against carrying planning to extreme and urged discrimination in determining its extent.

A lengthy question period, concerning all phases of tool room operation and management, was indicative of the keen interest in Mr. Clarke's lecture. Eighty members and guests were present.

Henry T. Welch, past chairman, presided and introduced the speaker, who was thanked by A. McKinney Rice, first vice-chairman.

Versatility of resistance welding was shown in a General Electric sound film, depicting such varied applications as the welding of hairlike wires for electronic tubes and the fabrication of bodies for streamlined Diesel locomotives.

## Sees Aluminum Opening New Eng. Opportunities

Hamilton, Ont.—With aluminum replacing heavier materials in short supply, for an increasing number of products, new fields are being opened for the product and tool engineer.

In fact this light weight metal may become the material of the future, John W. Lengbridge, project engineer and chief draftsman of Aluminum Goods, Ltd., Toronto, told 150 Hamilton members and guests. Mr. Lengbridge discussed deep drawing of aluminum at a meeting October 8, when Blue Top Brewery of Kitchener was host to the chapter.

Author of a series of aluminum processing articles running in *The Tool Engineer*, Mr. Lengbridge highlighted technical points with slides and work pieces. Some samples were scribed off in squares on flat blanks to show the effect of forming on the blank.

Before the technical session, the group enjoyed a buffet dinner. A German band and comedian entertained.

George Gilmore, first vice-chairman, conducted the meeting in the absence of Gordon Hall, chairman, who was ill. Harry Sehl of Kitchener introduced the speaker.

## Quiz Pays Cartwheels

San Diego, Calif.—Attraction for the opening fall session of San Diego Chapter, October 8, was the "Silver Dollar Quiz," staged by T. J. Donovan, Jr., ASTE national director.

Mr. Donovan, who heads a heat treat consulting and equipment manufacturing firm in Philadelphia, Pa., asked questions pertinent to tool design, die set-up and heat treating. Silver dollars rewarded those giving correct answers.

Ray W. Peters, Chapter chairman, and Leslie F. Hawes, Los Angeles Chapter chairman, arranged for the program.

# Coming MEETINGS

**ALL CHAPTERS**—January. Election of Nominating Committee. Consideration of nominees for National Directors.

**AKRON**—January 10. Speaker: E. B. Rhodes, industrial sales rep., Bendix-Westinghouse Automotive Air Brake Co., Elyria, Ohio. Subject: "Use of Air in Jigs and Fixtures."

**CENTRAL PENNSYLVANIA**—December 16. Speaker: J. I. Karash, Reliance Electric & Engineering Co., Cleveland, Ohio. Subject: "Design of Dies for Inclined Presses." January 20. Speaker: K. N. Macomber, Lapointe Machine Tool Co., Hudson, Mass. Subject: "Latest Developments in Surface Broaching."

**CHICAGO**—December 11. Ladies night Christmas party, Shoreland Hotel. Dinner, dancing, entertainment.

**CLEVELAND**—January 14, 6:30 p.m. dinner. Plant tour, Eaton Manufacturing Co., Axle div., 739 East 140th St.

**DETROIT**—January 13. Speaker: Herman Goldberg, Snow Mfg. Co., Chicago. Subject: "Observations on High Speed Drilling and Tapping."

**ELMIRA**—January 3, 7:00 p.m., Mark Twain Hotel. Speaker: J. L. Schwab, manager, Northeast div., Methods Engineering Council. Subject: "Engineering Methods."

**FLINT**—December 18, Zhenders Hotel, Frankenmuth, Mich., Dinner, 7:00 p.m.; entertainment, dancing.

**NEW YORK, GREATER**—January 3. Speaker: Philip M. McKenna, president, Kennametal, Inc., Latrobe, Pa. Subject: "Carbide, Its Development and Application in the Machine Tool Industry."

**KANSAS CITY**—January 5, 7 p.m., Advertising and Sales Executives Club. Speaker: A. O. Schmidt, research engineer, Kearney & Trecker Corp., Milwaukee, Wis. Subject: "Principles and Practice with Modern Milling Machines."

**NEW HAVEN**—January 13, 6:15 p.m., dinner at Fitzgeralds; 8:00 p.m., meeting, Dunham Laboratory, Yale University. Speaker: O. H. Somers, Standard Gage Co.. Subject: "Tools for Dimensional Quality Control."

**NIAGARA DISTRICT**—January 6, Niagara Falls, Ont. Speaker: R. C. Cunningham, Canadian Westinghouse. Subject: "Electronic Adjustable Speed Drives."

**PEORIA**—January 4, 6:30 p.m., Pere Marquette Hotel. Joint meeting of seven engineering societies—A.S.M., A.W.S., S.A.E., A.S.M.E., A.I.E.E., A.S.A., and A.S.T.E. Speaker: James F. Lincoln, president, Lincoln Electric Co., Cleveland, Ohio. Subject: "Benefits of Free Enterprise."

**PITTSBURGH**—January 7, Fort Pitt Hotel. 6:30 p.m., dinner; 8:00 p.m. meeting. Speaker: T. J. Donovan, Jr., Donovan Co., Philadelphia, Pa. "Silver Dollar Quiz" program with audience participation. March 10-12, William Penn Hotel, ASTE 17th annual meeting.

**RACINE**—January 10, 6:30 p.m., Racine Manufacturers Bldg. Speakers: Ray P. Kells, chief service engineer; Stewart G. Fletcher, chief metallurgist, Latrobe Electric Steel Co., Chicago. Subject: "Modern Developments in Heat Treating and Production of Tool and Die Steels."

**SPRINGFIELD, ILL.**—January 4, 6:30 p.m., The Mill. Speaker: J. R. Lawrence, Marshall & Huschart Machinery Co., Chicago, Ill. Subject: Film lecture on Bullard Man-Au-Trol Spacer and Gorton Duplicator.

**TORONTO**—January 5. Subject: "Modern Trends in Machine Tool Design," sponsored by Modern Tool Co.

**TRI-CITIES**—January 5. Plant visitation, J. I. Case Co., Bettendorf plant.

**TWIN STATES**—January 12, Springfield, Vt. Speakers: L. J. Sheehan, C. G. Leitch, Henry Webster. Subject: "Material Selection."



V. G. Lottman (left) director of purchasing research for Ford Motor Co., and Russell Bobbitt (right), chairman of Georgia chapter, ASM, are introduced by George Brown, chairman of Atlanta chapter, ASTE. Mr. Lottman addressed joint meeting of the two societies.

## Sees Great Potential For Southern Industry

Atlanta, Ga.—First meeting of the season for Atlanta chapter was held jointly with Georgia chapter of ASM, October 4, at the Henry Grady Hotel.

Guest speaker for the evening was Victor G. Lottmann, director of purchasing research for Ford Motor Co., Dearborn, Mich.

In his talk, Mr. Lottman pointed out his company's sincere desire and willingness to purchase as much as possible locally, within competitive limits. He emphasized the South's potential in the supply of good labor and raw materials necessary for the cotton industry, paint manufacture, paper, glass, and spring production, all used in the automobile field.

Other companies have also announced plans to utilize freight savings and productivity of the southern area.

Notable guests included Henry Dorsey, plant manager of Ford's New Hapeville plant, and Carl Johnson, chief of purchasing at Ford in Hapeville.

## Film Favors Turret Lathe

Atlanta, Ga.—Advantages of machining round workpieces on turret lathes were presented in a Gisholt Machine Co. film at the October meeting of Atlanta Chapter.

While many types of lathes are available, and each has its particular usage, the turret lathe was shown as ideally suited for parts production in most metal working plants.

Important points in favor of this machine are: minimum of setup time as compared to automatic screw machines; high repetitive accuracy; extensive use of standard tooling, lower setup cost for a variety of jobs; and use of relatively simple fixtures to do jobs that would be difficult or impossible on other equipment.

Prior to the film showing, George Brown, chapter chairman, urged participation in the current membership drive to build the chapter to one of the strongest in the entire organization. "There are many qualified member-prospects in the vicinity, and we should not relax our efforts until they have all been approached on membership in our Society," he said.

## Obituary

George T. Koch

Thrown from his car and pinned beneath it, George T. Koch, founder and president of Engineering Service, Inc. of America, Detroit, Mich., died instantly, October 10, in an automobile accident at Canton, Ohio.

Mr. Koch was a native and lifelong resident of Detroit. After 17 years' association with Murray Corp. of America, he resigned as master mechanic in 1939. Entering a partnership, he subsequently became sole owner of the company he headed at the time of his death. He was also president and general manager of the Visi-Trol Corp.

Professional advancement in engineering was one of his major interests. In his own plant he conducted refresher courses, taught by a University of Detroit professor. Employees and other engineers attended the classes to prepare for state examination for professional registration. Mr. Koch was registered as a Professional Engineer in 35 states.

He was author of the book, "Motor Body Blueprint Technology," had contributed to technical articles, and served on the Punch and Die Design Authors Committee of the forthcoming ASTE "Tool Engineers' Handbook."

Mr. Koch was first vice-chairman of Detroit chapter, ASTE; chairman of the Salary and Fees Committee of the Michigan Society of Professional Engineers, membership chairman of Detroit chapter of the same organization, and a director and vice-president of the National Association of Engineering Companies.

Other affiliations included the Society of Industrial Engineers, the Engineering Society of Detroit, the Detroit Board of Commerce, and several fraternal orders.



# GOOD READING

## *A Guide to Significant Books and Pamphlets of Interest to Tool Engineers*

**SOURCES OF ENGINEERING INFORMATION**, by Blanche H. Dalton, is a practical guide to engineering literature and data, and is designed as a concise reference for engineering students, engineers, research workers and librarians.

Recognizing the need for a compilation listing source material for engineers, the author has compiled here a reference, based upon the library of engineering material at the University of California, which covers published abstracts, location of articles, bibliographies, reference books, trade catalogs, and standards and specifications.

This volume includes information on every type of engineering, including aeronautics, electronics, illumination, electrical engineering, mechanical engineering, metallurgy, materials testing, and mining.

The 109-page work is available from the *University of California Press* at \$4.00 per copy.

**DRILLING AND SURFACING PRACTICE**, by Fred H. Colvin and Frank A. Stanley can virtually stand without introduction with the by-line of these two men, co-editors of *American Machinists' Handbook*, etc. This is the revised third edition of the volume, and includes what the Preface mentions as major techniques evolved during the war years which have become a part of standard practice.

Drilling, reaming, tapping, planing, shaping, milling and broaching are the major section headings. In this third edition, new grinding methods are included, with the many applications resulting from refinement of practice. Improvements in the field of milling machines are discussed, covering the

more recent types of carbide and high-speed steel cutters. New designs for reamers and taps are included, in addition to added tables on step-drilling, dealing with the use of deep taper pins.

The book is arranged in clear, easy-to-read style, with clarified illustrations throughout. Photographs and tabular material are well correlated with the text.

"Drilling and Surfacing Practice," 523 pages, is published by *McGraw-Hill Book Company, Inc.*, 330 West 42nd St., New York 18, N. Y.

**MANAGERIAL CONTROL OF BUSINESS**, with George T. Trundle, Jr., heading a group of eight collaborating editors from the Trundle Engineering Company, is a thorough and practical manual of business organization and operation. Five major fields of modern business are covered: analysis of company operation; general management problems; sales management; manufacturing; and industrial relations.

"Analyzing the Company Operation" (Section 1) covers profit-volume relationships, sales volume, financial controls, manufacturing from an overall viewpoint, research, compensation and incentives, and cost and pricing, among other topics. The second section, dealing with management problems, includes organization, management methods, budgets, cost control and executive reports. Markets and sales are covered in "Sales Management," the third section, and such subjects as market studies, selling methods, salesmen's selection and compensation are discussed.

Organization of the manufacturing end is the lead item in Section 4, "Manufacturing." Plant layout and maintenance, inventory and quality control, and labor compensation are covered.

Perhaps the only argument we have with this section is the tendency to group under "Methods Engineering" what we believe to be the functions of the tool engineer.

"Managerial Control of Business" is a volume prepared by business men for business men and engineers, and is one of the volumes on the subject that deserves a place on the office bookshelf. "Managerial Control of Business" may be obtained at \$5.00 per copy from *John Wiley & Sons, Inc.*, 440 Fourth Ave., New York 16, N. Y.

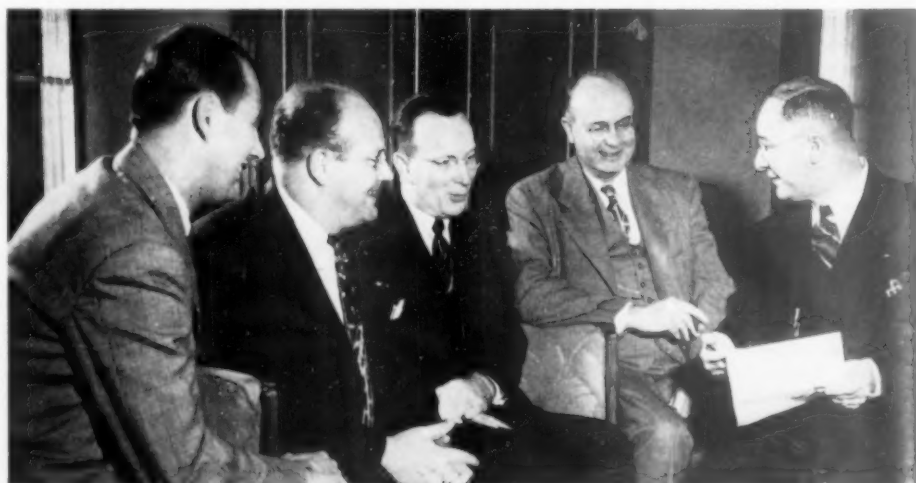
**YOUR CREATIVE POWER**, by Alex Osborn places imagination and ideas on the important level they deserve. Mr. Osborn's book is in a way a success story from an autobiographical standpoint, in that it shows his gradual realization of the significance of ideas and imagination properly used, through his start and early failure as a cub reporter to his rise as head of one of the nation's largest advertising agencies.

Not an "airbrush theory" or "how to get ahead" story, Mr. Osborn's book is an interestingly-written, full-of-good-serious-thought analysis of creative power, organization of creative thinking, and direction of ideas. He presents some definitely thoughtful comments on the regulation of ideas and the unconscious effect of the person's background and attitude, generally speaking, on his disposition and application of ideas.

A few of the chapter outlines present applications of Mr. Osborn's thoughts to current problems: need of creative thinking; and adapting other ideas to one's own.

The 375-page book is available from *Charles Scribner's Sons*, 597 Fifth Ave., New York 17, N. Y.

Shown at left are the newly-elected officers for 1948-49 of the National Tool and Die Manufacturers Association, as announced during the annual meeting of the association in Milwaukee, Nov. 14-16. From left to right are: J. H. Stanek, treasurer, Stanek Tool & Mfg. Co., Milwaukee, treasurer; Alfred Reinke, vice president, Gus Reinke Machinery & Tool Co., Hillside, N. J., secretary; R. H. Cope, manager, The Bunell Machine & Tool Co., Cleveland, second vice president; Centre W. Holmberg, president, August W. Holmberg & Co., Inc., New York City, first vice president; and J. J. Kohl, president, The International Tool Co., Dayton, president.



# THE TOOL ENGINEER'S

# Service Bureau

FREE BOOKLETS AND CATALOGS CURRENTLY OFFERED BY MANUFACTURERS

## Air Line Filter

Catalog page describes the improved automatic air line filter featuring a transparent plastic bowl, in which the filtering element and any foreign matter are fully visible. Water, dirt, and oil removed from compressed air lines may be quickly cleaned from the bowl. *M-B Products*, 130 E. Larned St., Detroit 26, Mich.

## Alloys, Copper-Base

Technical bulletins list important properties, available forms, and typical applications of five copper-base alloys—Fansteel 601, 602, 603, 606, and 607—which offer advantages over copper, brass, or common bronzes for many electrical and mechanical applications. *Fansteel Metallurgical Corp.*, North Chicago, Ill.

## Alloys, Die

Bulletin 96, on Ampco bronzes for forming and drawing dies, announces the new Grade 24 which offers high hardness and high compressive strength. Design, machining, and use information is included. *Ampco Metal, Inc.*, Milwaukee 4, Wisc.

## Bearings, Miniature

Catalog 49, of eight pages, provides full specifications on more than 40 types and sizes of standard miniature ball bearings for precision mechanisms. With outside diameters ranging from 2mm to 5/16 in., bearings include radial, super-light, pivot, angular contact, and thrust types. Many are available in beryllium copper and stainless steel as well as chrome alloy bearing steel. *Miniature Precision Bearings, Inc.*, Keene, N. H.

## Bufs and Polishing Wheels

Handsome 32-page brochure covers the complete line of precision-made buffs and polishing wheels, made from a wide variety of cloth materials and leathers sewed or cemented together to provide the utmost operating efficiency under various conditions. Polishing wheels are available in cotton cloth, walrus, canvas, sheepskin, duck, bullneck leather, and felt. *American Buff Co.*, 2414 So. LaSalle St., Chicago.

## Burnishing Machine

Swiss-built machines for fast, precision polishing of bearing surfaces on small, pivot pins—as used in meters, clocks, and fine instruments—are described in 4-page folder. Employing tungsten carbide wheels, machines polish hardened steel or even soft steel or brass. *Hauser Machine Tool Corp.*, Manhasset, N. Y.

## Bushings, Self-Lubricating

Self-lubricating Graphalloy bushings—from graphite impregnated with babbit, copper, or other metal—are featured in 8-page pamphlet. Graphite forms a low-friction lubricating film on the shaft, which is not soluble in gasoline, water, or oil. Bushings may be used in dry or submerged locations. *Graphite Metallizing Corp.*, 1050 Nepperhan Ave., Yonkers 3, N. Y.

## Carbide Sawing Machine

Leaflet announces gravity-feed cemented carbide sawing machine, which cuts round, rectangular, square, or triangular pieces with minimum operator attention. Diamond impregnated 4" cut-off wheels or laps are

used. *Howell Macduff & Co.*, 91 Prescott St., Worcester 5, Mass.

## Castings, Investment

"New Horizons with Microcasting" describes the process and illustrates many typical parts produced by it for leading manufacturers. Emphasized are its advantages for mass production of small intricate parts from high-temp alloys. *Austen Laboratories, Inc.*, 715 E. 69th Pl., Chicago 37.

## Conveyor, Interfloor Belt

Bulletin illustrates and describes the simplified, all-purpose, Floor-Veyor, Jr., an escalator-type power belt conveyor that may be changed in length by simply adding or removing standard sections of frame and belt. Standard belt is a rough top, rubber covered, 3-ply canvas duck, 10 or 16 in. wide. *The Rapids-Standard Co., Inc.*, Dept. FA-181, Grand Rapids 2, Mich.

## Conveyor, Press Room

Bulletin PV-48 shows the Press-Veyor power belt conveyor, a unit especially adapted to movement of stampings in press room and the elevation of many different items in other types of production. *The Rapids-Standard Co., Inc.*, 342 Rapistan Bldg., Grand Rapids 2, Mich.

## Couplings, Flexible

The 24-page catalog No. 48 covers the many types of flexible couplings, including standard forged steel and cast semi-steel couplings, and shear pin, mill motor type, brake drum, bolt-on, and detachable hub couplings. Complete data is offered on their construction, operating, and performance features. *Ajax Flexible Coupling Co., Inc.*, Westfield, N. Y.

## Cut-Off Machine

Bulletin features the Fox swing frame cut-off machine, which offers full maneuverability through 180°, and is designed for use with the "flexible" type cut-off wheels. It is recommended particularly for the removal of sprues and risers from castings. Wheels operate at a peripheral speed of 15,500 fpm; cuts can conform quite closely with the contour of the casting. *Fox Grinders, Inc.*, Oliver Bldg., Pittsburgh 22, Pa.

## Drafting Machines

Bulletins 6-48 and 7-48 announce stainless steel drafting machines, which feature fast, accurate, full board coverage, true horizontal adjustment through any degree to true vertical, and fit any board. *Emmert Mfg. Co.*, Waynesboro 2, Pa.

## Dresser, Wheel Form

Fluidmotion radii and angle dressers for form-dressing grinding wheels are described in 8-page bulletin. Typical forms obtainable are outlined, and specific operating instructions are given for principal shapes. *J & S Tool Co., Inc.*, East Orange, N. J.

## Drills, Hard Metal

Leaflet highlights the Hi-Rockwell carbide-tipped drills which will cut through tool steels of C-40 to C-68 Rockwell hardness, and will drill through hard and soft, or soft and hard, stock successively, without

any sideward cast. *Ray-Metal Co.*, Walled Lake, Mich.

## Drill Press

The eight-page Catalog 400 is devoted to the 14-inch precision drill press, available in bench or floor model. Machine features one-piece head casting, fully mobile head, belt tension release, feather-touch quill bearing adjustment, six-spline spindle, precision ground table, and other refinements. *South Bend Lathe Works*, 417 East Madison St., So. Bend 22, Ind.

## Duplicating, Die-Less

Revised 40-page catalog includes many recent additions to the Di-Acro line of die-less duplicating machines for hand-operated bench use. The extensive line includes rod parters and benders, shears, punches, notchers, and brakes. *O'Neill-Irwin Mfg. Company*, 375 Eighth Ave., Lake City, Minn.

## Education

Brochure points up the many study courses available at the non-profit Dunwoody Industrial Institute, including mechanical drafting, machine shop, sheet metal, welding, and other subjects. Separate bulletins give more detailed information on individual courses. *The William Hood Dunwoody Industrial Institute*, Minneapolis 3, Minn.

## Fabrics, Industrial

Eight-page bulletin points out advantages of nylon in a wide variety of products, and of fiberglass in electrical motors, dies, molds, laminated products, and others. *The Duplan Corp.*, 512 Seventh Ave., New York 18.

## Gages, Carbide

Savings as high as \$20,000 annually are described in a brochure of case histories of plants using carbide gages. The wear-resistance and long life of carbide gages cut costs three ways—less gage checking, less gage replacement, and more parts passed. *Lincoln Park Industries, Inc.*, 1719 Ferris Ave., Lincoln Park 25, Mich.

## Gear Shaver, Universal

Bulletin describes the Red Ring method of diagonal shaving of gears, as contrasted with previous methods. The Model GCV combines advantages of its predecessors and may be used for either conventional or diagonal shaving. *National Broach and Machine Co.*, 5600 St. Jean, Detroit 13.

## Grinders

Catalog of 32 pages covers the complete Thompson line of hydraulic surface grinders, heavy-duty, tool room, contour, and broach grinders... all engineered for maximum efficiency. *The Thompson Grinder Co.*, Dept. 56, Springfield, O.

## Instruments, Indust. Waste

Catalog 7301, of 44 pages, describes a wide range of flow and liquid level meters, remote transmission systems, thermometers, pressure gages, electronic recorders, and other instruments used in the handling and treatment of industrial wastes. A number of applications are illustrated. *Brown Instrument Co.*, Wayne & Roberts Aves., Philadelphia 44, Pa.

# North East West South IN INDUSTRY

**W. V. O'Brien** has been appointed general sales manager of **General Electric's** apparatus department, according to an announcement by **Chester H. Lang**, vice president in charge of sales. Mr. O'Brien has been assistant general sales manager since December, 1947.

**Carl J. Murray** has been appointed general superintendent of **Jessop Steel Co.**, Washington, Pa. At the same time, **Edward J. Sherrill** was named superintendent of production scheduling and shipping. **Ellsworth E. Seitz** was made director of personnel relations. **Norris B. MacFarlane** was named to superintendency of the electric furnace department, with similar positions announced for **Edwin C. Thomas, Jr.**, and **James O. McDowell** in the bar mills and sheet mills, respectively.

**Andrew P. Massey** has been appointed to the staff of the Engineering Electronics section of the **National Bureau of Standards**, where he will head the electronics standardization group. Mr. Massey has done extensive work on the theory and operation of electronics equipment, principally in the installation field.

**William S. Bussey** has recently been named assistant chief of the Office of Weights and Measures of the **National Bureau of Standards**, where he will participate in planning and conducting the Bureau's cooperative weights and measures program with state and local administrative groups.

An expansion program underway at **Kennametal, Inc.** which involves an expenditure of over \$200,000 is announced by **Alex G. McKenna**, vice president. The extension, which will provide an additional 6,000 sq ft of space for the carbide division, is the second expansion of plant space for the Latrobe, Pa., firm within a year.

## COMING EVENTS

Jan. 10-14, 1949. ANNUAL MEETING AND ENGINEERING DISPLAY, Society of Automotive Engineers, Book-Cadillac Hotel, Detroit.

Jan. 10-14. MATERIALS HANDLING EXHIBITION, Convention Hall, Philadelphia.

Feb. 28-Mar. 4. SPRING MEETING, American Society for Testing Materials, Edgewater Beach Hotel, Chicago.

Mar. 10-12. SEVENTEENTH ANNUAL MEETING, American Society of Tool Engineers, William Penn Hotel, Pittsburgh.

The **Fenn Manufacturing Company** of Hartford and New Britain announced recently that it has acquired the machinery lines of **Standard Machinery Company of Providence**. **W. L. Fenn**, president, said the new line will put his company into the manufacture and sale of metal rolling mills, punch presses, swaging machines, Turk heads and special large diameter bearings.

**Vernon L. Cox** has recently been named manager of engineering for the switchgear divisions of the **General Electric Company**. Mr. Cox, who has been serving as assistant manager of engineering of the divisions, will replace **C. H. Black**, who was appointed manager of engineering of G-E's construction materials divisions.



John S. Batten



P. H. Batten

**John H. Batten** has recently been elected president of the **Twin Disc Clutch Company**, according to an announcement by the company's board of directors. **P. H. Batten**, founder of the company, who previously was president and chairman of the board, will continue his interest in the company as board chairman.

**Vanadium-Alloys Steel Company**, Latrobe, Pa., has announced the formation of a subsidiary, **Vanadium-Alloys Steel Societa Italiana**, in cooperation with **Elli, Zerboni & Co.**, of Turin, Italy. The firm has been established to facilitate tool steel sales now impeded by credit and exchange regulations.

**Viking Products Company, Inc.**, 2373 E. Eight Mile Road, Detroit, a new company organized to produce automatic air valves, has announced completion of its developmental program, and installation of equipment for mass production at its Vicksburg, Mich., plant, on a line of solenoid operated air valves. **C. F. Leathers**, general manager of the company, has also announced the appointment of **William R. Allen** as sales manager.

**Colonel John Slezak**, president of the **Turner Brass Works**, Sycamore, Ill., has been elected to membership on the board of trustees of **Illinois Institute of Technology**, it was announced recently by **Dr. Henry T. Heald**, president. Dr. Heald at the same time announced the election of **Ludwig Skog**, senior partner of **Sargent & Lundy**, Chicago, to the board.

**Walter C. Bates** has been named manager, and **Dr. George F. Ruger** assistant manager of a recently-created technical service division which has been announced by **Diamond Alkali Company**.

**Elgin National Watch Company** has announced that its **Sapphire Products Division** will be known as the **Industrial Products Division**, to include products other than sapphire which are now being fabricated or contemplated for the future.

**Ernest H. Lauter** and **George Omelianoff** have organized the **Progressive Welder Sales Company** of Ohio to serve accounts in eastern Ohio, Western Maryland, western Penna., and northern West Virginia.

**C. I. MacGuffie** and **R. C. Freeman** have been appointed manager of sales and manager of engineering, respectively, of the **General Electric** welding divisions, according to **A. F. Vinson**, manager of the divisions.

**Ralph W. Morrison** has been appointed general sales manager of the **Aro Equipment Corp.**, Bryan, Ohio. Other appointments include **E. W. Iman**, promoted to sales manager of the Lubricating equipment division; **E. L. Jackson** to sales manager of the Industrial Tool division; **M. J. Anderson** to manager of the Fittings division; and **G. S. King**, who was named advertising manager.

**John H. Poulson** has been appointed to the board of **Regional Sales Supervisors of Eutectic Welding Alloys Corp.**, covering eastern United States and Canada.

**Lin C. Cook** has been appointed chief industrial engineer for **Willys-Overland Motors**, it was announced by **William E. Paris**, vice president, manufacturing.

## OBITUARIES

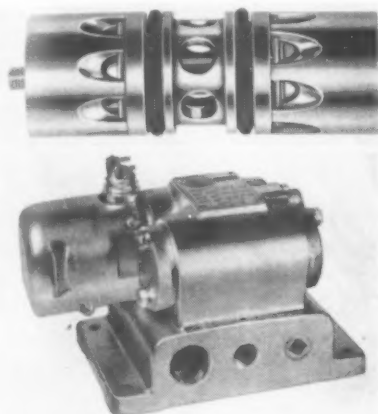
**Aldus Chapin Higgins**, chairman of the executive committee of **Norton Company**, died recently. Mr. Higgins was the son of one of the founders and the first president, of Norton Company, and first joined the company in 1911. He was elected president of the firm in 1933, became chairman of the board in 1941, and finally chairman of the executive committee in 1946.



# TOOLS OF TODAY

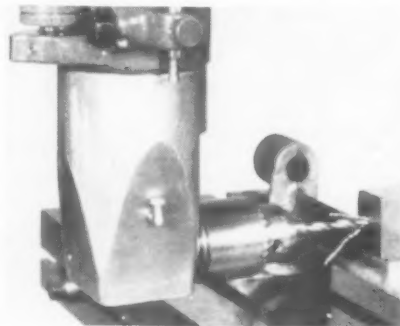
## Solenoid-Operated Air Valves

The "Ring-Seal" line of solenoid-operated air valves, by Viking Products Co., Inc., 2373 E. Eight Mile Road, Hazel Park, Mich., features among other innovations a single interchangeable and easily replaced valve assembly, shown in detail in upper photo. This is incorporated in all valves up to  $\frac{3}{4}$  in. and larger, whether 3 or 4-way and whether 3, 4 or 5 port.



The design of this assembly is said to be largely responsible for the high operating speed of these valves—up to 600 strokes per minute—and for the quick filling and dumping of cylinders with smooth action and quietness. The valves are designed for operation as standard with 110 V.-60 cycle a.c., and with air pressure up to 105 p.s.i. and over. However, solenoids can be furnished for other frequencies and voltages if desired.

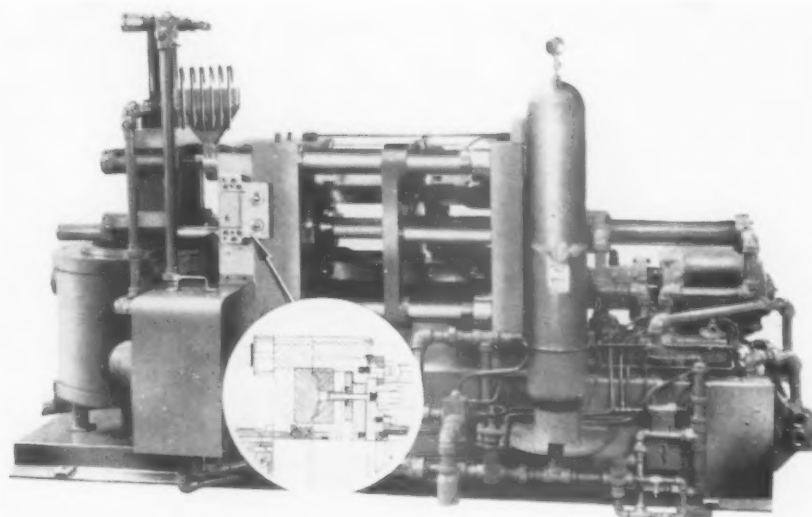
T-1-12



## Auxiliary Milling Attachment

An auxiliary, precision, horizontal Milling Attachment designed to increase the scope of vertical milling machines and other machine tools, is announced by the Bemis & Call Co., of Springfield, Mass.

Adjustable to nearly any position, the attachment handles precision milling, drilling and boring at any angle, making



## High Speed Die Casting Machine Features Unit Dies

A Die Casting Machine, by the B & T Engineering & Sales Company, Penobscot Bldg., Detroit 26, Mich., is designed to give almost continuous production with essential flexibility of schedule for individual castings. Developed by L. W. Blauman and E. M. Tallberg, veterans in the die casting field, this machine features among other improvements an arrangement whereby the fixed and travelling plates are adapted to directly receive die inserts in their abutting faces.

Thus, four die units, each of which is a complete die 8 in. in diameter, be-

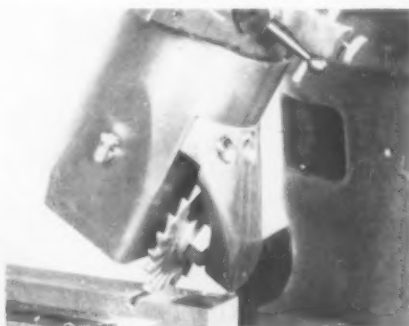
come an integral part of the machine plate. Each of these units may be changed at will and other units or dies may be substituted as production demands may require. This feature eliminates the expense of building a complete separate die. The machine is engineered for rapid cooling and automatic ejection, and a visual water discharge funnel allows the operator to observe the flow and temperature of water coming from the dies.

Claimed as the major improvement is the method used in machine plate construction. Both fixed and travelling units are recessed to hold respective halves of the die. Made of 8 in. round steel, the dies are mounted flush with the machine plates and secured by set screws which seat into annular grooves in the bases of the dies. This indicates an obvious economy in that the machine itself carries the inbuilt unit die as contrasted to the conventional method of clamping the dies between the plates. Once the machine is set, no further adjustment is required.

Other features include accurate positioning of the machine plates, which are accurately jig bored. The operating machine plates have conical surfaces, located about an axis parallel to the tie bars, to assure alignment and to obviate the need for conventional guide pins and bushings.

Furthermore, the machine has four toggles instead of the conventional two, thus reducing shear load. The toggles exert a locking pressure of 450 tons, enhancing safety and accurate production within the entire range of operations which, incidentally, displaces from 3 lbs. of metal per shot under 4000 lbs. p.s.i., to 16 lbs. under 1000 lbs. pressure.

T-3-12



it possible to do all the necessary machining with the original set-up. Accommodating one or more cutters up to 4 in. in diameter, it also will take a standard chuck of  $\frac{1}{2}$  in. capacity for drilling, boring and reaming at a 90° angle to the drive shaft. Precision-built, with a gear ratio of one to three, the attachment is readily installed and dismounted.

T-2-12

**Profit experiences-**

WITH **ELGIN**  
*Sapphire*  
WEAR RESISTANT

P-121



**CONTACT POINTS**

Sapphire Tipt indicator points time tested in thousands of gage installations outwear carbides — cannot scratch or mar surfaces — non-porous, hard, do not load. Standard or to your specifications — For the ultimate in dial indicator gaging accuracy use Sapphire tipt contact points and Sapphire inserted gage anvils.

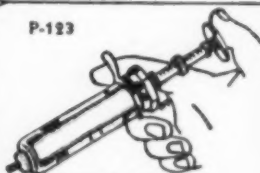
P-122



**SAPPHIRE STOP**

Sapphire can take it — Again outwearing all other materials — This time as a "stop" in telephone relay equipment. Preliminary tests showed that Sapphire stands up the equivalent of 40 years actual life — In this instance 11,000,000 blows without wearing the Sapphire or the metal part.

P-123



**HYPREZ DIAMOND COMPOUND**

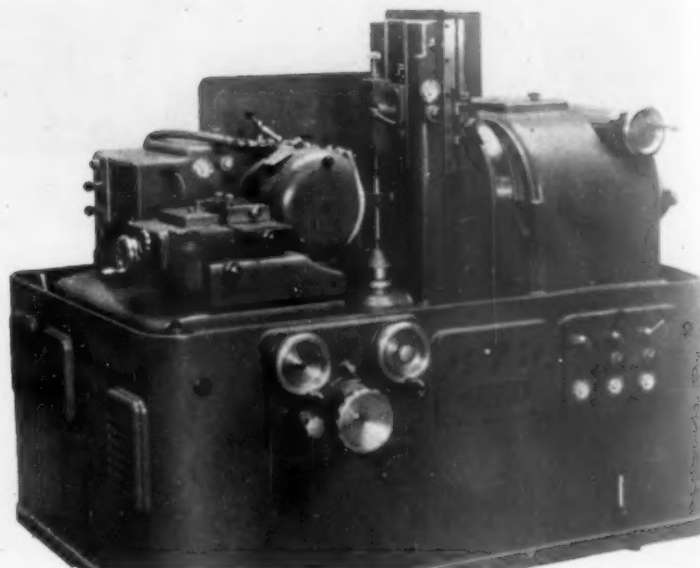
Save 1/3 to 1/2 of your finishing time. Hyprez produces any desired finish in a fraction of the time required with other materials — cleaner, easy to use, dependable, predictable results — every time. No contamination. Use Hyprez on Carbides, Steels, Chrome, Quartz, Ceramics.

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**ELGIN**  
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PRODUCTS DIVISION, AURORA, ILL.

**ELGIN NATIONAL WATCH COMPANY**



### Generating-Type Precision Gear Grinder

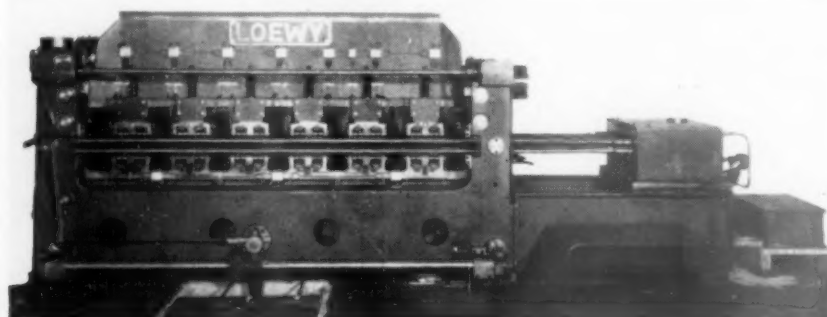
Cosa Corporation, 405 Lexington Ave., New York 17, N. Y., is exclusive agent in the United States for the Reishauer—Zurich, Switzerland — Gear Grinding Machine. This machine is of the generating type and designed for precision gear grinding at high production.

The machine is not limited to a restricted number of cutting faces, but,

employing a single thread grinding worm with thread profile, generates the theoretical shape gear teeth by means of an infinite number of enveloping cuts.

The machine is designed to grind spur and helical gears up to 9½ in. in diameter and up to 6 diametral pitch. Because of its high production capacity, it is claimed that gears with pitches below 32 DP can be economically ground from the solid blanks.

T-372



### Shearing and Trimming Equipment

Equipment for maximum production of flattened, edge-sheared and cut-to-length plate, by Loewy Construction Co., Inc., 570 Lexington Ave., New York 22, N. Y. includes two complete lines:— one for ½ in. x 104 in. x 33 feet and the other for .200 in. x 104 in. x 16 feet. Each line consists of feeding tables, backed-up type leveller, pinch rolls, edge trimmer, up-cut shear and gauge table. On the heavy line the plates are loaded singly from pile by a vacuum lift un-piler and, after being processed, are removed singly by a similar vacuum type piler.

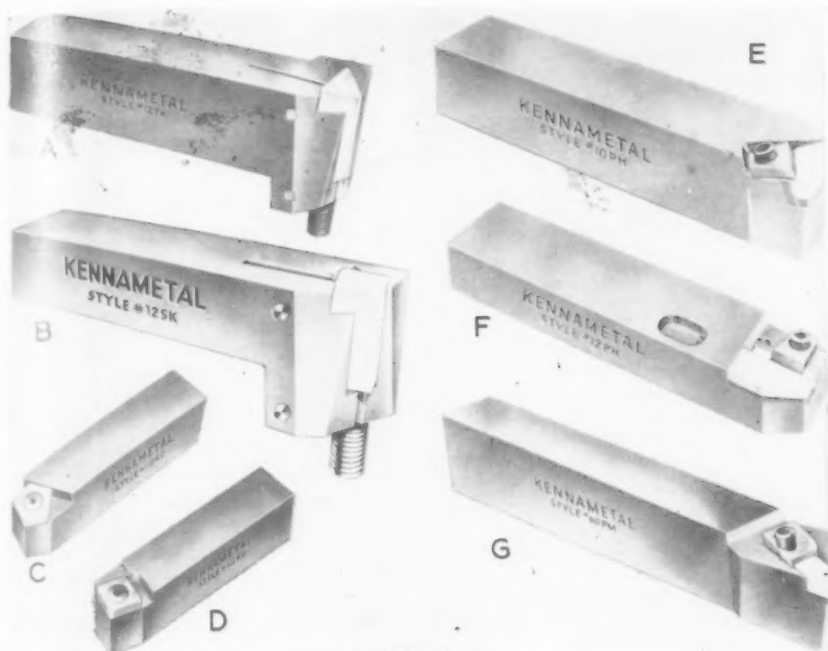
The back-up type roller leveller illustrated is of unique design. The bottom nest of rolls can be dropped out of bending position quickly or returned without disturbing the set of the machine. The top nest of rolls have

special designed back-up roller nests which operate through mechanism to flex the top work rolls. Means are provided for keeping back-up rolls clean by readily removable wipes.

The edge trimmers are of the rotary shear type with exclusive design features. The knives can be adjusted in two planes. In a vertical plane the top knives can be raised or lowered or they can be moved forward or backward from the perpendicular axis of the knives. In a horizontal plane the lower knives can be adjusted axially for clearance or wear. At no time are the gears out of pitch-line mesh and efficiency is said to be kept at maximum as the gears never change centers.

Each line, designed for operating speeds of 100 to 300 feet per minute, has two operating stations from which the whole line is controlled electrically. Remote control of the light gauge leveller roll flexing is done by Selsyn Positioner control.

T-4-12



### Kennametal Expands Cutting Tool Line

Kennametal Inc., Latrobe, Pa., has expanded its line of inserted-bit and clamped-on bit tools to include the "Kennamatic," shown at A and B; the "Kendex," shown at C and D; and Planer Tools, shown at E, F and G in the composite photograph.

The expanded line of "Kennamatic" tools has indexable and replaceable square and triangular solid Kennametal inserts mechanically held as shown by the two typical styles—12TK and 12SK—illustrated. These tools are a development of the Style RK tools having cylindrical inserts.

Six different styles having triangular inserts are now available with K-M cemented carbide inserts K2S, K3H, or K6, depending on the type of metal to be machined, and in sizes  $\frac{3}{4}$  in. square to  $1 \times 1\frac{1}{2}$  in. These tools are suitable for a wide range of work including cam plunging on automatic lathes. Also available are two styles, with K2S, K3H or K6 K-M inserts in sizes from  $\frac{3}{4}$  in. square to  $1 \times 1\frac{1}{2}$  in., designed for such operations as turning, facing and large boring. The manufacturer claims, for the Kennamatic line, such advantages as high compression strength—up to 800,000 p.s.i.—due to inserts being held vertically and further being devoid of brazing strains.

The Kendex Line brings mechanical holding to the smaller sizes of tools— $\frac{1}{2}$ ,  $\frac{5}{8}$ ,  $\frac{3}{4}$  and 1 inch square—and features a flat tip held to a steel shank with a countersunk flat head cap screw and socket nut. Tips are made in four different shapes—round, triangular, square and pentagonal, the latter two illustrated.

Advantages claimed for these tools are that they are indexable and can therefore be rotated to provide a succession of sharp cutting edges without changing the setting of the tool holder. Grinding can be entirely eliminated

since the tips may be discarded when all of the available cutting edges have become dulled.

The clamped-on Planer Tools, designed for machining cast iron, feature a recently developed, extra-strong K-M composition—grade K1—along with the Kennametal clamped-on principle and distinctive cutting angles. According to the maker, these tools are capable of removing 3 to 4 cubic feet of cast iron between grinds when used in any of the late type planers having clapper box lift. T-5-12

### Electric Impact Nut Setter

A powerful, portable electric Impact nut setter—the Speed-O-Matic, by Illinois Gage & Mfg. Co., 4639 W. Washington Blvd., Chicago 44, Ill.—tightens or removes nuts, bolts, studs and lag screws and can also be used for drilling and tapping.



The unit is torqueless and is said not to twist in the operator's hand when the nut tightens, thus providing greater ease of operation with lessened fatigue. Driving at 1750 R.P.M. at free speed, the impact unit automatically delivers 3000 impact blows per minute, at point of resistance, and tightens to a torque of over 200 foot lbs. on a  $\frac{3}{4}$  in. bolt. The tool is instantly reversible for removing nuts or bolts. T-6-12

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THE TOOL SAVING FLUID

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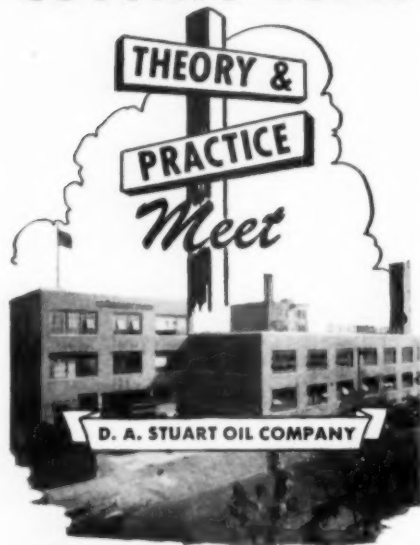
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# Where CUTTING FLUID



**S**ELDOM does the most carefully developed scientific theory provide the final answer in the shop; neither is practical experience entirely dependable. It usually takes a combination of both in order to select and apply the cutting fluid that will give the best results on a given machining job.

D. A. Stuart Oil Company offers you a combination of theory and practical experience that pays dividends in better machining and fewer production headaches. The theory emanates from research in the modern D. A. Stuart laboratories; practical approach comes from men who have years of experience in shop problems and techniques. That is why Stuart products so often smooth out jobs on which other cutting fluids fail. Ask your D. A. Stuart Oil Co. representative to tackle your tough jobs.

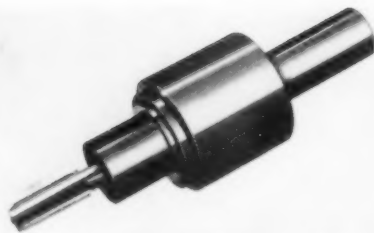
## ON-THE-JOB REPORTS PROVE RESULTS

"... D. A. Stuart's SOLVOL Water Mixed Cutting Compound was put in on a trial basis for milling high carbon alloy steel. High speed alloy cutters were used and it was found that SOLVOL increased the cutter life 3 to 4 times over what they had been getting. ..." Write, if you would like to have a booklet on SOLVOL.

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with every barrel

**D. A. Stuart Oil Co.**  
EST. 1918

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### Floating-Releasing Tap Holder

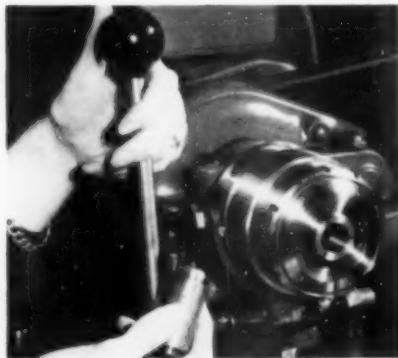
A unique floating-releasing Tap Holder, announced by the Empire Tool Co., 8774 Grinnell Ave., Detroit 13, Mich., incorporates a releasing clutch and pull-out designed to correct for parallel and angular misalignment. It is claimed that the holder will not bind under tension or compression, and that it will float tap out of hole freely. The amount of float is adjustable.

The tool can be readily changed from right to left hand by loosening the pull-out lock screw in the shank, sliding the complete float and release mechanism out of the housing and turning the right or left-hand dog 180 degrees.

The clutch mechanism of the tool, for which the manufacturer claims reduced setup time and longer tap life, with a lessening of tap breakage and elimination of bell mouthed holes, automatically spaces itself upon releasing and prevents hammering of the clutch parts when the tap revolves. Made for use on all types of turret lathes, the holder is made in 2½ in. size to take taps from ½ in. to 1¼ in., however, it is possible to take a tap as small as ⅜ in. by using a special collet. **T-7-12**

### Quick-Acting Collet Chuck

The Goodwin Manufacturing Company, Cuyahoga Falls, Ohio, announce a quick-acting Collet Chuck developed to speed chucking operations on South Bend, Logan, Atlas and similar types of lathes. Utilizing a multiple leverage principle and the cantilever action of hardened steel fingers, the chuck is said to provide a positive "vise-like" grip on material.



The control lever requires only finger tip pressure for actuation, in no way interferes with operator efficiency and has a quick-release feature to secure chucking of work while spindle is in motion.

The threaded nose cap is removable

for collet change, or it can be turned to adjust collet gripping pressure. Chuck capacity permits the use of bar stock up to full diameter of spindle bore, and short pieces of even greater diameter can be handled. No push tube or draw-bar is required.

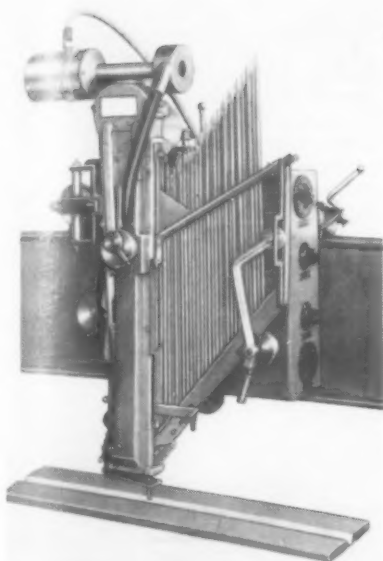
Chucks are available in two sizes: 1-inch capacity, to fit lathes having 1½-in. eight-threaded nose spindle, and the 2-inch capacity model, which can be fitted to any lathe spindle up to 3¾ in. in size. **T-8-12**

### Preheater for Plastics

A 3-kw, 40-megacycle Preheater for rapid and uniform preheating of plastic preforms is announced by the Industrial Heating Division of General Electric Company, Schenectady, N. Y. Operating on 230 volts, single phase, 60 cycles, the unit will heat 40 oz. of wood-flour phenolic compound from 70 F. to 250 F. in one minute, or one pound of this material in 24 seconds.



Readily portable and built for heavy-duty industrial use, this preheater is provided with an automatic "pop-up" cover which facilitates the loading and unloading of plastic preforms. In addition, two timers with associated control permit operation alternately with two presses having different load requirements. Among features is the incorporation of three meters, the dials of which are mounted on the front of the cabinet. One of these indicates the direct-current applied to the oscillator circuit, which is an indication of the rate of heat input to the preforms; another shows safe operation of the oscillator tube; and the third indicates either oscillator or rectifier filament voltage. Separate rheostats in the filament circuit permit proper voltage setting, thus assuring long tube life. **T-9-12**



### Portable Welding Head

A portable Arc Welding Head, designed to produce continuous welds using standard coated electrodes, is announced by Elge Associates, 16 E. 71st St., New York 21, N.Y.

The machine is said to produce faster and better welds than by hand welding methods since the arc is not interrupted during the automatic change of electrodes. The model illustrated will weld sheet and plate and join right angle or oblique sections in addition to longitudinal welds on curved surfaces such as pipes and tanks.

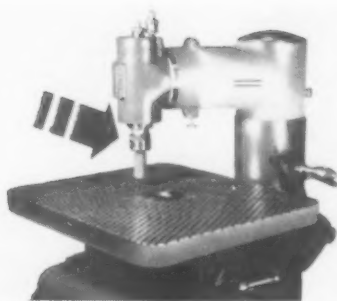
The welder is equipped with all necessary vertical and horizontal adjustments for welding current and regulation of arc length. The carriage, which has a speed adjustment between 1 and 40 in. per minute, travels on a track fabricated of tubing. Straight track is furnished, with curved track easily fabricated. **T-10-12**

### Unistrut Selector

A rapid calculating, vest-pocket size slide rule-type Beam Load and Column Load Selector has been especially designed to estimate quickly and accurately the amount of weight which can be supported by various Unistrut sections under varying conditions of span and unbraced height. Conversely, the selector also provides the various combinations of Unistrut sections required to support a given load.



The selector, which should be of considerable interest to engineers, architects, contractors and maintenance men, is available, if requested on company letterhead, from Unistrut Products Company, 1013 West Washington Blvd., Chicago 7, Ill. **T-12-12**



### Improved Profile Grinder

All No. 2 Profile Grinders by Boyar-Schultz Corporation, 2110 Walnut

Street, Chicago 12, Ill., are now being built with an improved method for holding grinding wheels. This incorporates the use of a specially designed, double taper collet chuck which is attached to the top of the spindle and which accommodates collets in sizes from  $\frac{1}{8}$  to  $\frac{5}{8}$  in. in steps of  $\frac{1}{8}$  in.

In addition to superiority in holding wheels, this improvement permits the use of wheels with any shank size within the limits of these dimensions. A convenient method of tightening and loosening the collet chuck has also been incorporated into the design. One  $\frac{1}{2}$  in. collet is furnished as standard equipment, with other collet sizes available from Chicago stock. **T-13-12**



You know that Multiple Drilling slashes production costs. But do you know that the

## THRIFTMASTER "Universal"

IS THE

Highest Quality

...  
Lowest Price

UNIVERSAL DRILLHEAD

2-6 Spindles  
from \$158.00

Immediate Delivery

**T**WENTY-FIVE YEARS of drillhead engineering experience is built into the rugged power of Thriftmaster heads. Quantity production, combined with modern equipment and skilled craftsmanship result in minimum prices. Check these important features:

The superior construction of these versatile tools marks them as the outstanding investment for your present and future drilling jobs.

- Adjustable to any hole pattern
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- Close center distance Settings
- Maximum flexibility
- Proven performance
- Long life at full rated capacity

Write for name of our distributor in your area and for literature on Thriftmaster full ball-bearing Adjustable or Fixed Center Drillheads. No obligation, of course.

**Thriftmaster Products Corporation**

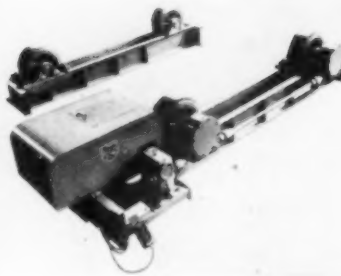
1038 N. Plum St., Lancaster, Pa.



## Turning Rolls for Welding

An improved line of turning rolls, designed to increase welding production, is announced by Ransome Machinery Co., Dunellen, N. J. Capable of carrying heavier loads with less handling, the rolls help produce neater, better and quicker welds on tanks, drums, pipes, and pressure and cylindrical vessels of all types, by allowing all welds to be made in the downhand position.

Featured are the anti-friction, self-aligning bearings in both the power and idler rolls of the larger sizes; a lowered drive mechanism, which permits unobstructed loading from either end; and an exclusive, combination steel and



bronze worm wheel, the latter reinforced against stresses resulting from heavy loads by the addition of a steel hub and center to which the bronze rim is firmly bolted.

## SIEWEK ANNOUNCES...

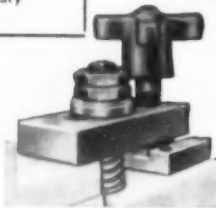
**Four NEW Small  
"C" Type Drill Jigs**



**Two Spring Type  
Two Rack and Pinion Type**

*Write for sizes and  
detailed information*

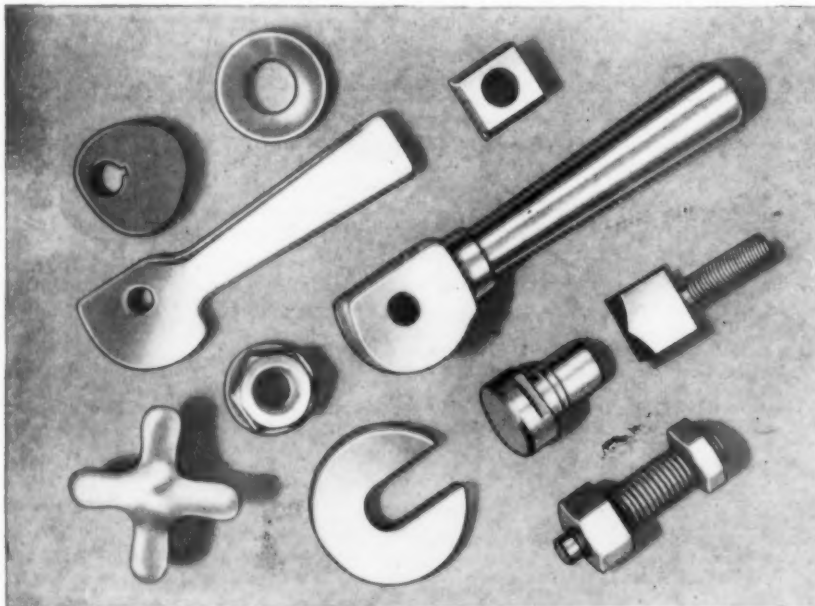
Our New Catalog  
will be ready to  
distribute in  
January



### SIEWEK FIXTURE CLAMPS

These clamp assemblies are made in **14 STYLES in 73 SIZES**. There is a clamp to meet the requirements of practically any need. Fixture Details are available in **15 STYLES in 156 SIZES**.

**Immediate Delivery**



Manufacturers of  
**SIEWEK**  
*Fixture Clamps  
and Fittings*

**SIEWEK TOOL COMPANY**

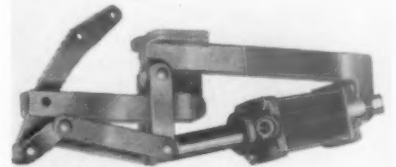
2860 E. Grand Blvd., Detroit 2, Mich.  
Distributors in Principal Cities

In operation, the vessel has merely to be placed on the rollers and rotated around to the welder or automatic welding head at the desired welding speed.

Self-propelled turning rolls on four wheel carriages are also available, these making possible the automatic welding of all circular—as well as longitudinal—seams, both inside and outside, with the automatic welding head remaining in one fixed position. This eliminates all vibration at the welding head itself and insures good continuous weld. **T-14-12**

## Air-Operated Toggle Clamp

A unique toggle-action, air-operated Clamp, by Lapeer Mfg. Co., Lapeer, Mich., manufacturers of Knu-Vise products, is intended for use where a clamping support would be inconvenient for efficient production. A plier-like grip is produced by the toggle bar—which acts as a supporting member—and the toggle jaw, which does the actual clamping.



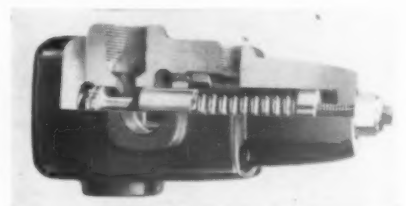
Known as Model DTAO-400, this clamp is designed to materially facilitate production, as in the case of holding the water channel on automobile bodies during welding, a task which has heretofore been considered difficult. In use, both the toggle bar and jaw swing clear to allow free removal of work.

The supporting pressure of the toggle bar is 400 lbs. at outer rivet, and the clamping pressure of the toggle jaw is approximately 300 lbs. at inner hole at operating air pressure of 85 lbs.

**T-15-12**

## Chatter-Free Relief Valve

Chatter-free performance is claimed for a hydraulic relief valve developed by the Gerotor May Corporation, P.O. Box 86, Baltimore 3, Md. Its function is to protect hydraulic systems against damaging overloads of pressure.



In addition to a dash-pot feature which stops chatter, the valve design embodies, among other improvements, pressure ports which permit an in-line piping arrangement; valve springs in two sizes—for 5-300 and 50-1500 p.s.i.—a spring guide, available with "O" ring seal when the valve incorporates a hand-wheel adjustment; a one-diameter bore for accurate plunger fitting; and a self-sealing locknut which eliminates lost valve caps. **T-16-12**



## 15-Ton Deep-Throat Press

A 15-ton Rousselle Deep Throat Press—Model 2-G—added to the regular line of open-back inclinable and adjustable bed horn punch presses manufactured by the Service Machine Company, 7627-33rd Ashland Avenue, Chicago 20, Ill., features an 18 in. throat which permits working to the center of 36 in. sheets.



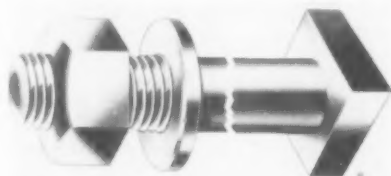
The bolster plate measures 11 x 16 in. and the shut die height is 7 $\frac{3}{4}$  in. to the bed. This press has a standard 2 in. stroke; making it adaptable to a wide variety of work that would ordinarily require larger and slower presses.

The frame, proportioned for rigidity and strength with a minimum of deflection, is designed so that the bed protrudes, allowing clearance for some jobs that would ordinarily require horn presses. The bed has a 6 in. opening, allowing blanks and slugs to fall through.

This press is equipped with a single-stroke or continuous clutch, roller bearing flywheel, a large air-cooled brake and hinged motor mount, and operates at 200 RPM with a 1 HP, 1750 motor. Weight complete 1875 lbs. T-17-12

## Alloy Steel Machine Bolts

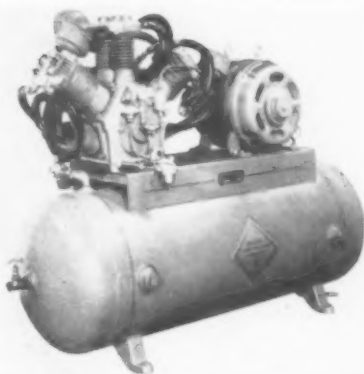
Boyar Schultz Corporation, 2110 Walnut St., Chicago 12, Ill., announces a line of 1 in. alloy steel special Machine Bolts made to conform to dimensions and standards of strength adopted by leading press manufacturers and users.



Both bolts and nuts are accurately threaded for close fit, and heat treated to insure maximum properties. Washers, too, are heat treated, with edges chamfered and both sides ground to insure parallelism. Bolt dia. is 1.000 in. and the square head 1 $\frac{1}{8}$  x  $\frac{1}{8}$  in.

T-18-12

## Versatile Air Compressor



An Air Compressor that can "grow" to meet expanding demand for air is announced by Air-Flo Compressor Co., Akron 7, Ohio. The basic compressor, shown mounted on the tank, uses 18 principal parts to construct 48 different pumps single or 2-stage types.

All parts are completely interchangeable from the smallest to the largest pumps, and it is therefore practical to purchase a pump suited to immediate needs; then, when added volume is needed, to buy additional parts to increase the capacity of the compressor.

Air-Flo Compressors are available in sizes from 1 to 40 h.p. with 2.5 to 275 c.f.m. capacity at 30 to 300 lbs. pressure in vertical, V-type or side-angle construction.

T-19-12

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**HARDENED**  
**WAYS • GIBS • RACES**

**Welded tool steel ways. Bearing surfaces 64-66 Rockwell "C" Scale. Any length or cross section. Send your inquiries for estimates.**

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**FORM • SPECIAL • CUT-OFF • HIGH SPEED • CARBIDE**

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**OHIO KNIFE Co.**  
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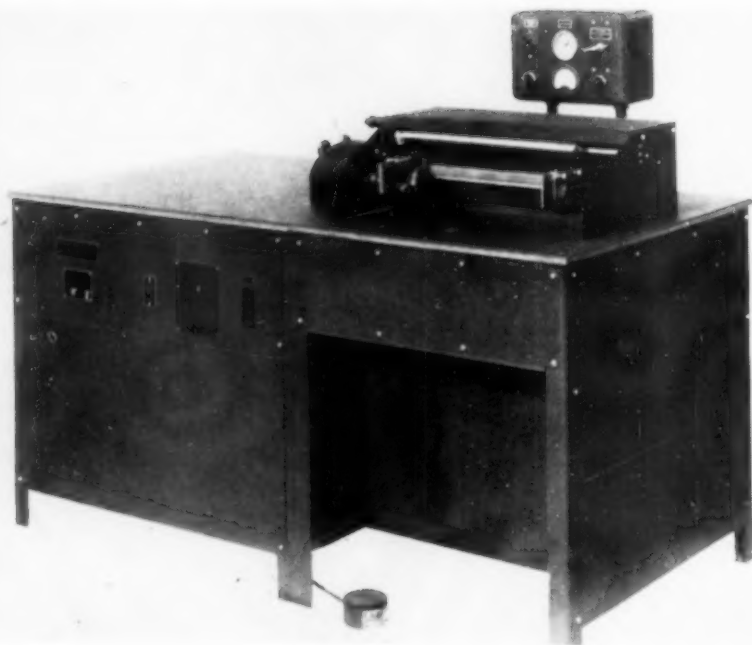
**THE OHIO KNIFE CO.**  
CINCINNATI 23, OHIO

Gentlemen: Please send your catalogue without obligation.

COMPANY \_\_\_\_\_

ADDRESS \_\_\_\_\_

NAME \_\_\_\_\_



### Inspection Units By Magnaflux

A line of DUOVEC inspection units, by Magnaflux Corporation, 5900 Northwest Highway, Chicago, Ill., magnetizes parts and permits parts to be inspected for defects, in any direction, with one

magnetizing operation and one visual inspection operation instead of the usual two or more previous magnetizations and inspections necessary.

The system comprises the application of two magnetizing forces simultaneously. The parts are placed between the heads on the unit, where they re-

ceive magnetization in both directions during one shot while the inspection bath is being applied.

In the type MV Magnaflux DUOVEC unit, a current is passed through the part as in normal circular magnetization. At the same time the part is subjected to a longitudinal field of regularly changing strength. The resultant varying magnetizing force swings through an angle within the piece of considerably more than 90° and thus cuts across all possible defects at right angles, as is required for best adherence of magnetic particles to form indications of the defects which can be easily seen.

Swing of the field may be adjusted from 0° to well over 90° by changing the relation of values between the circular and longitudinal magnetizing fields. This type of magnetization is used with the fluorescent Magnaglo particles as well as the usual wet Magnaflux visible particles to obtain indications of defects in the parts.

At present, inspection with DUOVEC is mostly applicable to the smaller parts which are substantially uniform in cross-section and essentially cylindrical or bar shaped. This includes many parts made and inspected in high volume, such as bolts, wrist pins, roller bearings, small gears, and camshafts.

T-20-12

### Checker for Helical Gears

A "Red Ring" Checking Head, designed to determine the helix angle wobble of a gear, its size, eccentricity and roughness of roll, simultaneously or separately by rolling the work gear with a master gear under predetermined pressure, is a recent development of National Broach & Machine Co., 5600 St. Jean, Detroit 13, Mich.



The spindle which carries the master gear holder is mounted in a yoke which may be rotated through 90°; thus, either conventional or 90° drive gears may be checked with equal facility. The spindle is so mounted that, when the two gears are under uniform spring loaded contact, it is quite sensitive to both axial and radial displacement. When the gears are rolled together, such displacements are measured by precision dial indicators located on the head behind the spindle yoke.

The head shown in the photo may be used on any of the standard Red Ring gear checkers, while that in the inset is used for checking index or tooth spacing.

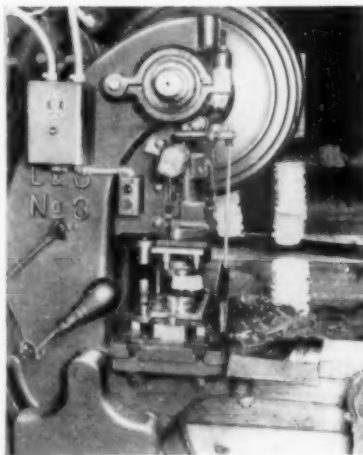
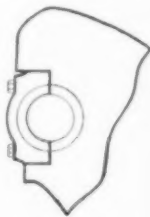
T-21-12

*Lots of little things make*

## L & J PRESSES BETTER!

**F**OR instance, the method by which the bearing load is conveyed to the frame on both the up and down strokes. Bearing caps remain tight, as the studs are not loaded when pulling dies out of a drawn piece of work.

Check every detail of an L & J Press and you'll find lots of little things—and big things too—that assure a longer service life, lower maintenance costs and a better product—things learned in nearly a half century of working with press users—things that make L & J Press first choice of so many companies. Send for catalog.



Dependable L & J Sales Engineers at Your Service

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1911

## L & J PRESS CORP.

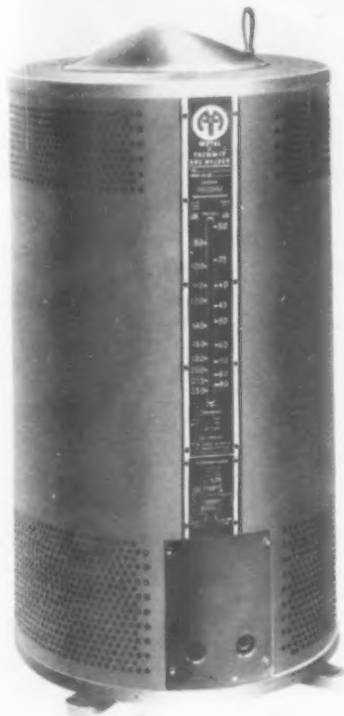
SUCCESSORS TO LUDWIG JORDAN TOOL & MACHINE CO.

Elkhart, Ind.

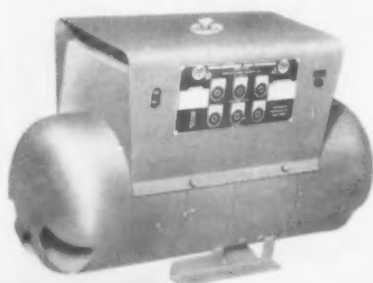
**830 REN ST.**

## Compact Arc Welders

A line of a-c and d-c arc Welding Machines, by Metal & Thermit Corporation, 120 Broadway, New York 5, N.Y., features built-in power-factor corrector; fingertip, stepless current control; fan-forced ventilation; wide current range; and moderate open-cir-



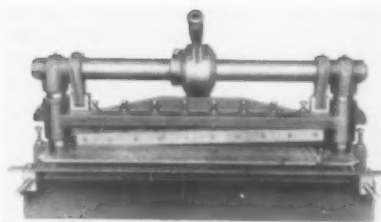
cuit voltage operation. The units, of the transformer type available in 150, 200, 300, 400, 500 amp capacities, also provide instant plug-in and plug-out of electrode leads by taper-type connector. Lead interchange is avoided by a permanent work lead connection. Running gear is available where portability is required.



Major design feature of all d-c models is a one-dial simplified control panel which carries a series of well marked outlets, each one for an electrode of different diameter. The operator simply plugs into the proper outlet and dials for any required minor adjustment in current.

The A-C unit at right, the D-C unit below, include 200 amp units powered by air-cooled Wisconsin engines, and 300 and 400 amp sets driven by Chrysler industrial engines.

T-22-12



## 24 Inch Bench Shear

Added to the line of "Die-less Duplicating," by O'Neil-Irwin Mfg. Co., 375 Eighth Ave., Lake City, Minn., is a precision Di-Acro Shear designed to cut practically any material from lightest of tissues to 16 ga. steel. Heavier gauges of more ductile metals in proportion,

with maximum shearing width 24 inches.

A protracting gage, for squaring and mitering, may be adjusted to any desired angularity while a material gage can be mounted on back of the shear for accurate sizing of stock or in front for precision trimming of edges of parts. An additional gage permits shearing strips to less than 0.025 in. width. A gravity chute, built into the heavy base, delivers practically all material sheared. A precision machine primarily designed for model, research and experimental work, the shear is also suitable for a wide range of production work, in this case relieving larger machines and providing an accuracy not usually found in the larger units.

T-23-12

# Install Ross-In-Line for a Full-Flo Line!

THIS  
NOT THIS

## Full Pipeline Capacity

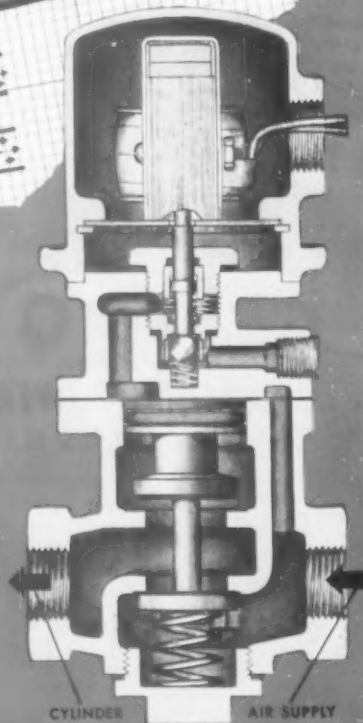
with lower initial and operation costs...

Yes, these new Ross-In-Line valves fill the bill—a dozen ways in every plant. Solve your "on-and-off" problems. Instant shut-off for plant-wide systems—a single coolant line — or split second control of a single acting cylinder. These air-controlled valves handle pressures 0 to 125 p.s.i.—air, liquid, and gas. Do it better, too, yet at lower cost.

## Here's Why...

- **FULL LINE CAPACITY...** Full Flo design provides full pipe size opening throughout valve. Eliminates "pinching" of line, reduces friction loss.
- **LOWER FIRST COST...** More capacity—therefore more efficiency—per dollar. Quick, easy, straight line installation. No mounting brackets.
- **LOWER OPERATING COST...** Only four moving parts, all non-corroding. Inspection without removing from line. Solenoid consumes only .2 amps. holding and 1.2 inrush at 110 v. 60 cy. Interchangeable pilot section simplifies service, decreases inventory.

Designed and built to stand up, seals are Hycar, other parts naval brass and stainless steel. Created specifically for efficient air operated control, straightway and 3-way, normally open or closed, 1/4" to 3/4" FULL FLO pipe capacity. As a dependable answer to your valve problems, Ross offers this latest addition to a line of over 300 quality valves designed for every phase of air control. Write for details and name of Ross representative in your area.



Solenoid-Pilot Sections Interchangeable on all 16 Ross-In-Line Bodies.



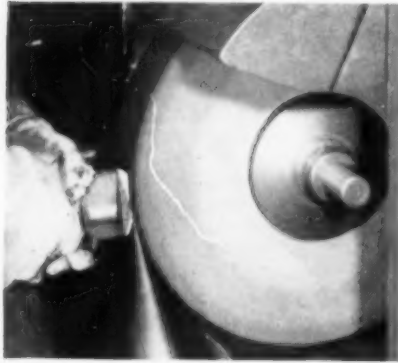
# ROSS OPERATING VALVE CO.

120 E. Golden Gate Avenue, Dept. 180

Detroit 3, Michigan



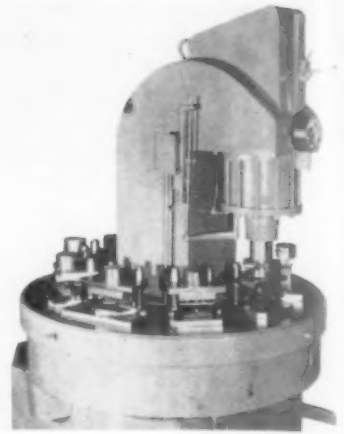
## High-Speed Grinding Wheel



A Contact Wheel, said to be the first designed for heavy grinding with abrasive belts at speeds of 10,000 surface feet per minute or more, is announced by Minnesota Mining and Manufacturing Co., St. Paul, Minn. Major advantages cited for belt grinding with the new roll—called the "K" contact wheel—are faster and cooler stock removal, lower production cost, and chatter-free grinding.

Designed for use at the maximum speeds of modern equipment, the combination of the high speed and the new wheel design enables abrasive belts to remove heavy metal stock faster, to perform better-finished snagging, and to eliminate frictional heat problems.

T-24-12



## Hydraulic Turret Press

A Hydraulic Turret Press, announced by the Rettig Engineering Company and distributed through the Universal Air-Line-Joint Mfg. Co., Lafayette, Ind., is designed primarily for short run production jobs where a schedule per day, week, or month is required.

This press has a large turret table designed to accommodate as many set-ups—depending on their size—as will fill the table. After initial mounting, the operator can readily change from one fixture to another whether the operation is blanking, forming, drawing, swedging or assembling.

These tools are built in three sizes—10, 20, and 30 ton—and may be operated either automatically or manually. The turntable, 48 in. O.D. and 20 in. I.D., is rotated by manual operation, and the press is equipped with easy-to-read load gauge, electric limit control, electric overload control, and magnetic power valve submerged in oil.

The tool is made in 3 sizes—No. 10, 20,000 lb. ram load, built in 3 models varying from 4740 to 9400 strokes per hour; No. 20, 40,000 ram load, built in 3 models varying from 4080 to 8200 strokes per hour, and No. 30, 60,000 lb. ram load, 3600 strokes per hour.

T-25-12

## High-Speed Collet Closer

A positive, quick-acting Collet Closer—the Super Ball-Matic High-Speed, by N. C. Nichols Machine and Engineering Corporation, 1 Sylvan St., Peabody, Mass.—is designed to convert lathes and hand screw machines into semi-automatics.

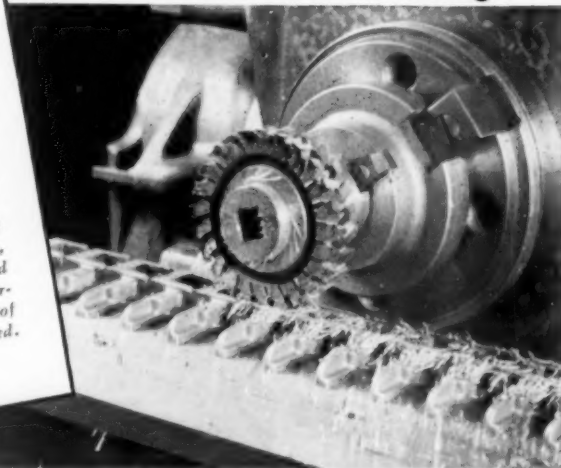


The closer, which feeds stock automatically in lengths to tenths, has no closing fingers or cams and operates at speeds up to 5000 RPM without stopping the machine. The closer is said to feed any shaped stock to the full capacity of the collet without pull-back from the stop. Presently available in models  $\frac{1}{2}$ ,  $\frac{3}{4}$  and 1 in. sizes.

T-26-12

## A NEW HOLDING METHOD for Production Milling

Because of the small size of these castings it was difficult to clamp them satisfactorily. Time study had established set-up for this job, mounting 6 pieces at a time in conventional fixture with 13 clamps. A Rockford Power-Grip chuck was substituted for the fixture, and 23 parts were located and held in a fraction of the former time. A net increase of 400 pieces per hour resulted.



## ROCKFORD POWER-GRIP MAGNETIC CHUCK INCREASES MACHINE OUTPUT 5 TIMES

The deep magnetic penetration does it. This entirely new and different principle of concentrating and directing magnetic flux supplies Rockford Power-Grip chucks with an intense holding power. Applied to suitable work in milling, turning, shaping, planing or grinding operations, this holding method offers advantages in convenience, ease and time savings over conventional chucks and fixtures.

### Increased Safety Factor

Rockford Power-Grip chucks are operated on 6 volt D.C. current, rectified from standard A.C. Rectifier and switch control are furnished with each chuck. Any danger to the operator, tendency to arc over, or possibility of chuck failure are consequently eliminated. Full insulation in addition to low voltage requirements make them absolutely dependable in either wet or dry operations.

### Methods Engineers

This new deep magnetic penetration method is rapid, easy and economical for production holding problems, as well as general tool room work. Get the complete story. Write today for a copy of our latest bulletin Magnetic Holding Methods.

Send prints and description of your work for complete proposal on Power-Grip Holding. No obligation.

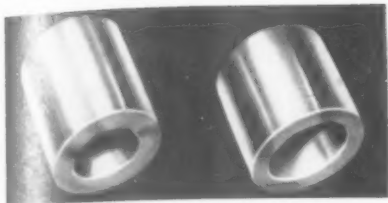
**ROCKFORD**

**MAGNETIC  
POWER-GRIP**



**ROCKFORD MAGNETIC PRODUCTS CO. INC.**  
1304 18th AVE. ROCKFORD, ILLINOIS

**CHUCKS**



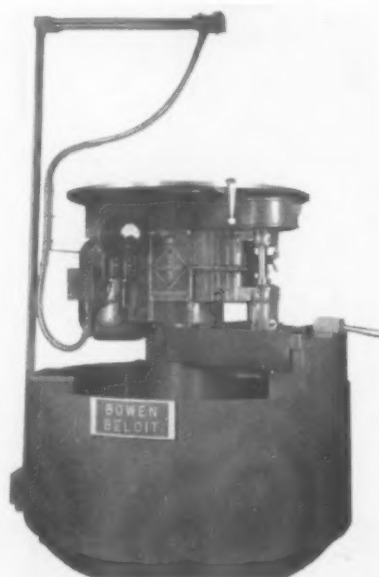
### Solid Kennametal Bushings

A line of Bushings, made of Kennametal Grade K6, is now available from Kennametal Inc., Latrobe, Pa., in 12 O.D. sizes ranging from  $\frac{3}{8}$  to 1 inch. Length and inside diameters are made to customer's specifications.

These bushings, which are adaptable to plain cylindrical plug and ring gage members, drill bushings and other wear-resistant applications, are supplied rough welded with only enough stock to assure minimum grinding to desired size. **T-27-12**

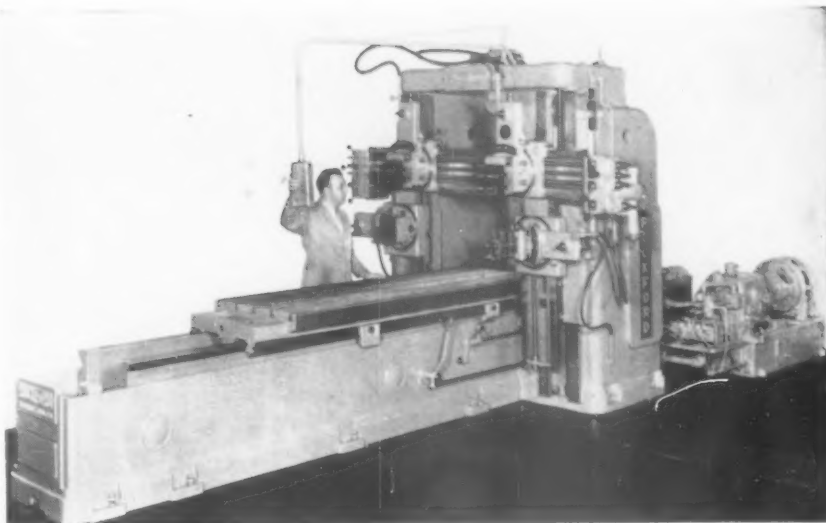
### Production Grinder Makes Debut

A production Face-Grinder designed to meet the exacting demands of modern mass manufacture has been developed by the recently formed Bowen Grinders, Inc., 1607 Crescent Drive, Beloit, Wis. Several of these grinders, ranging in size from  $\frac{1}{2}$  h.p. unit with 4 in. wheel to 15 h.p. with 14 in. wheel, are already in production and in use in industry.



Based on unique yet practical principles, the Bowen Grinder incorporates a grinding head free to move far enough, laterally, to grind a straight bar twice the diameter of the wheel used. Furthermore, its fixtures are so mounted horizontal that parts may be ground in one section while another is being loaded.

Construction also permits a number of fixtures to be positioned on the machine so that only the one needed will be operative, at the moment, without interfering with the rest. Either shear or face cuts may be made, according to the maker, and design permits construction of the machine in many sizes to meet specific requirements. **T-28-12**



### Hy-Draulic Shaper-Planer

Rockford Machine Tool Company, Rockford, Ill., announces a double-housing Hy-Draulic Shaper-Planer as a companion tool to the Hy-Draulic open-side machine.

As the hyphenated name implies, this machine combines the speed of a shaper with the greater accuracy and convenience of a planer, and is essentially designed for that class of "in-between" work which is just too small for economical machining on a standard planer, yet too large for a shaper.

Built to provide adequate rigidity un-

der all working conditions, the machine features, among other improvements, the use of hydraulic pressure for both feeds and table drive. Complementing this innovation are dual controls for rail head and table. The machine can further be supplied with two tool heads with automatic tool lifters for the cross-rail and two side heads with automatic tool lifters, the second crossrail head and side heads being extra equipment.

The machine is built in sizes 24 x 24 in., 24 x 36 in., 32 x 24 in. and 32 x 36 in., and five stroke length sizes ranging from 42 to 144 in. are built in each size.

**T-29-12**

## THE di-acro NOTCHER

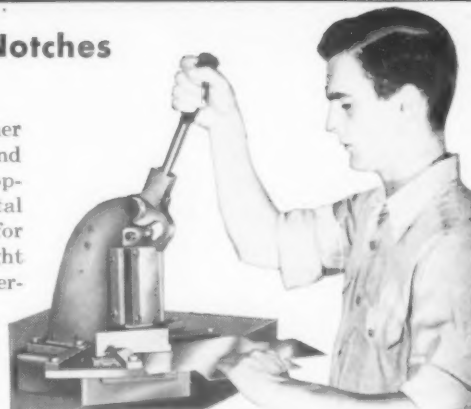
### Duplicates Precision Notches WITHOUT DIES!

The new precision Di-Acro Notcher eliminates the need for punch press and dies on many production notching operations. It is also ideal for experimental work as it can be quickly adjusted for any size or shape notch. Many straight shearing operations can also be performed with this flexible unit.

### CUTS CLEAN—NO BURRS OR ROUGH EDGES



DI-ACRO  
PRODUCTION EXAMPLES



The powerful Di-Acro Notcher has an exclusive roller bearing cam design which provides a tremendous pressure with a small amount of effort. The precision-ground Vee-shaped ram and blades of alloy tool steel assure clean cuts and permanent accuracy.

**LARGE CAPACITY.** The Di-Acro Notcher cuts 90° notches up to 6" by 6" in 16 gauge steel in one operation. Larger notches, and wider or narrower angles, can also be obtained.

**SEND FOR 40-PAGE CATALOG.** Gives full information on all six "DIE-LESS DUPLICATING" production boosters—Di-Acro Benders, Brakes, Shears, Rod Parters, Punches, Notchers—with many examples of accurately duplicated parts.

Di-Acro is pronounced "DIE-ACK-RO"

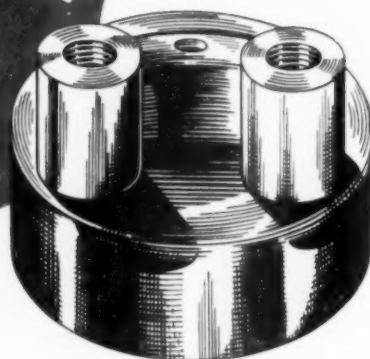


**O'NEIL-IRWIN MFG. CO.**

375 EIGHTH AVENUE, LAKE CITY, MINN.



**ANOTHER  
HY-PRO FIRST...**



## A Multi-Fluted Tap specifically designed to tap in all PLASTIC materials successfully **HERE'S HOW HY-PRO DID IT**

**PART:** Molded Plastic Electronic Control Base.

**PROBLEM:** Develop a tap, for tapping special plastic electronic control base, that will hold thread size and have an average life of better than 500 pieces per sharpening.

**HY-PRO SOLUTION:** Hy-Pro Tap Engineers tested the material, then designed a NEW multi-fluted tap to meet specifically the job requirements. Comparative tests with available competitive taps produced these results: 135 pieces per best available tap to 3200 pieces per Hy-Pro Plastics Tap.

Continued experience with leading makers of plastic parts has proved that this design will produce better results than any other tap, in any plastic.

Above is a typical example of how the Hy-Pro Sales Engineer can help increase threaded-hole production. His expert engineering counsel backed by the most up-to-date tap production methods combine to solve tapping problems rapidly and profitably.

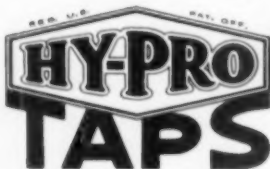
All Hy-Pro Taps are ground from tough uniform quality high-speed steel and given one of the Hy-Pro exclusive surface treatments.

Each tap is completely inspected by the latest electronic quality control equipment, your assurance that there will be no dimensional variance in Hy-Pro Taps of a stated size.

These precision manufacturing methods plus the ability of the Hy-Pro Sales Engineer to prescribe the correct tap for your particular job means *sustained accuracy* on your production line resulting in higher productivity from your tapping machines.

Let Hy-Pro solve your tapping problem—call a Hy-Pro Sales Engineer today.

*Order from your distributor.*



**HY-PRO TOOL CO.**

NEW BEDFORD, MASSACHUSETTS

A SUBSIDIARY OF CONTINENTAL SCREW COMPANY



### Portable Elevator

A portable Elevator—Model "C" by Montgomery & Co., Inc., 53 Park Pl., New York 7, N. Y.—is a light-duty, hand operated production unit of 750 lbs. capacity designed for stacking of materials and for moving comparatively light dies onto and from machine tables and platens.

The unit incorporates a self-locking safety type winch with a 3-speed handle adjustable for light, medium and heavy loads. Platform is 24 x 24 in. and lift is from 6 in. to 53 in. **T-30-12**

### Photo-Electronic Counter

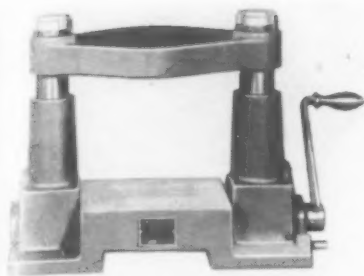
A Photo-Electronic Counter—Model 310, by the Potter Instrument Company, Inc., 136-56 Roosevelt Ave., Flushing, N. Y.—is a self-contained package including a photo-electronic detector, one electronic decade and a 6-digit electromechanical register. Rated at 6,000 counts per minute, it is designed for industrial applications where speeds are too high for purely mechanical counters.



Because the width of the photo-electric beam is only  $\frac{1}{4}$  in. and responds to light changes as small as 25%, closely-spaced small objects may be accurately counted. Register is seven digits, the last being indicated by neon flow lights of the electronic counter decade.

**T-54-12**





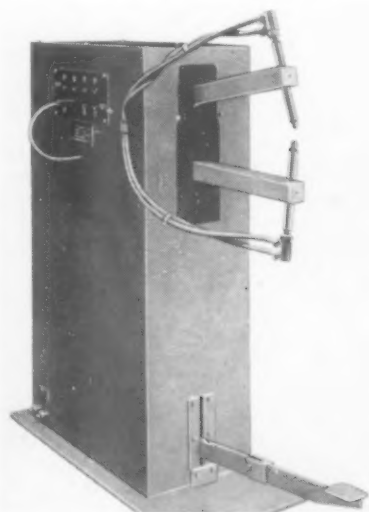
### Midget Spring Jig

Two midget size type "C" Spring Jigs have been added to the large line of drill jigs manufactured by Siewek Tool Co., 2862 E. Grand Blvd., Detroit 2, Michigan. The model 1600 has a working area of  $3 \times 3\frac{1}{2}$  in. with a closed opening of  $2\frac{1}{8}$  in. and a lift of  $\frac{3}{4}$  in. Model 1700 has a working area of  $4\frac{1}{2} \times 4\frac{1}{2}$  in. with a closed opening of 3 in. and a lift of 1 inch.

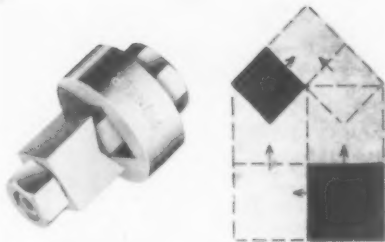
These drill jigs are especially adaptable for odd shaped work in which holes must be drilled, reamed, tapped or spot-faced, as they are open on both sides and the center location of the posts further aids in holding all pieces rigidly when doing multiple drilling. The patented SIEWEK spring lock is designed to assure a constant downward pressure which provides efficient precision drilling on rough castings, as the spring action holds the piece securely as rough spots are worn off by the machine vibration. **T-32-12**

### Electro-Weld Spot Welder

Electric-Arc, Inc., 152-162 Jelliff Ave., Newark 8, N. J., announces a line of electro-weld Spot Welders designed for fast, economical production. The welders feature 8-step current control, permitting 75% secondary voltage adjustment and a spring-loaded foot switch.



Electrodes are standard size, water cooled and readily renewed, while an arc-welded steel casing, with removable top and rear door for ease of inspection, allows ventilation. **T-33-12**



### Punch for Square Holes

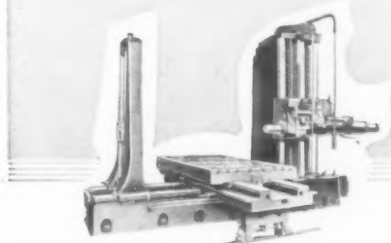
A "Chassis Punch", by the Pioneer Broach Co., Los Angeles, Cal., is designed to cut square holes in sheet metal and to simplify the job of attaching otherwise "hard to mount" parts, allowing this work to be done in a rapid and easy manner. The tool is not limited merely to square holes; in addition, angular, rectangular, L-shaped, or any square corner pattern type hole can be made by making combination cuts—if necessary—to achieve the desired pattern.

While designed to meet requirements of electronics and radio manufacturers, this tool is said to be equally applicable in the mechanical fields. **T-34-12**



# MAXITORQ

## KEEPS GOOD COMPANY



**W**e continue our "Good Company" series this month with the permission of Giddings & Lewis Machine Tool Company who have adopted the Maxitorq Floating Disc Clutch for their No. 351-T Table Type Horizontal Boring, Drilling and Milling Machine. A single, wet plate Maxitorq controls the power transmission in the feed and rapid traverse unit.

Maxitorq features that win approval from builders of machine tools, machinery and a

wide variety of motorized products include: compact design; Separator Springs that keep discs apart to prevent drag, abrasion and heating in neutral; assembly, adjustment and take-apart without tools; and complete assembly shipments so that clutch is ready to slip onto a shaft.

Maxitorq engineers will give you specific and practical recommendations for smooth, dependable power transmission.

Send for Catalog TE12

BCJ40

**THE CARLYLE JOHNSON MACHINE COMPANY**  
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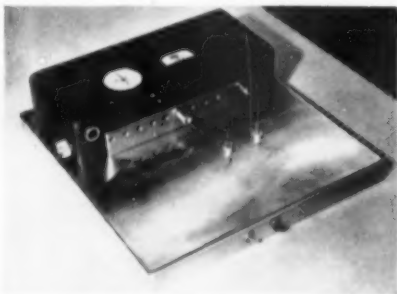
### HOLDERS FOR STUB CORE DRILLS

A line of Holders, for stub core drills, is now available from Eclipse Counter-bore Company, 1600 Bonner Rd., Fern-dale, Mich. Sizes of holders range through 1 1/4, 1 1/2, 1 3/4 and 2 in. in diameter and these take, in the order named, standard core drill cutters 1 1/2 to 1 13/16 in.; 1 7/8 to 2 3/16 in.; 2 1/4 to 2 9/16 in.; and 2 5/8 to 3 inch.



### Rotating Beam Fatigue Tester

A rotating-beam Fatigue Testing Machine, developed by the Hunter Spring Company, Lansdale, Pa., promises to give the wire producer, user, buyer and wire-forms designer fatigue data accurate within 1% error.



The instrument is said to permit new applications of fatigue knowledge to industry's daily chores, such as control charting of wire drawing processes; wire acceptance on the basis of statistical analyses of fatigue data; studying variations of fatigue characteristics throughout a wire lot; research studies in the fatigue field; predicting wire life in dynamic service—a quality control characteristic; using fatigue strengths and endurance limits as quality indexes; more efficient determination of safety factors in design; and determination of fatigue characteristics of small wire as a basis of design involving wire forms.

Design involves looping a sample of predetermined length through a complete 180 degrees so that the bending stress—at the peak of the loop—can be perfectly predicted, simply calculated and brought to as great a value as desired in order to hasten specimen failure. The machine is adaptable to wire from 0.005 in. to 0.030 in. in diameter.

T-35-12

Since the stub drills are inexpensive as compared to long core drills, and since only four holders are required for the entire range from 1 1/4 to 3 in., the economy in both inventory and tool cost is readily apparent. The stub drill-holder combination is equally applicable to core drilling in turret lathes and drill presses.

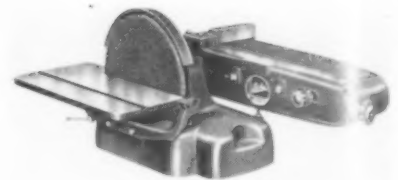
### Automatic Piston Pin Checker

Piston pins may be checked for average diameter and automatically segregated into six classifications by an automatic machine developed by The Sheffield Corporation, Dayton, Ohio. As now installed in the plant of a large automobile manufacturer, pins are manually loaded into a chute which has a "No Go" gaging fixture to prevent oversize parts from being accepted. The remaining parts are gravity fed into a locating "V" where a motor driven arm progresses a part into an air ring.



On coming to rest, it is checked by jets mounted in the ring which operate Sheffield "Airlectric" heads. These, in turn, actuate solenoids which open and close trap doors to the segregating chutes. The pin is then pushed through the air ring by the next piston pin to be checked, and is carried along by the traveling mechanism until it reaches its proper trap. Production segregating rate is said to approximate 2400 pins per hour.

T-36-12



### Belt and Disc Sander

A combination Belt and Disc Sander, by Atlas Press, 2314 N. Pitcher St., Kalamazoo, Mich., is designed for sanding of irregular shapes—long, short or wide stock—in metals, woods and plastics.

The machine is built to produce accurate finishes, on a production basis, on light or heavy work. Table, disc and drum spindles are ground, and disc and pulley balanced, with spindles turning in SKF ball bearings.

The tool features quick setup and efficient operation. The table may be used with either disc or belt, the latter operating in both horizontal and vertical position. Guards and stops are readily removable for sanding curved surfaces on either drum.

T-37-12

### Spur and Worm Gear Tester

The "Post-War" model Parkson Gear Tester features improvements designed to facilitate accurate checking of worm and spur gears without need of special fixtures or bushings when changing from one job to another.

For example, it will be noted that the worm with integral shaft, illustrated, rests on two Vee brackets. In this case, the worm shaft has different diameters on the ends, and the brackets are adjustable to compensate for this difference. The shaft is retained by hold-down devices.

However, the V-blocks may be replaced with cylindrical bushings, or with centers, when desired.

The worm carriage head swivels, with graduations in degrees and vernier to give readings in 5 minutes. When the machine is required for checking spur helical or herringbone gears the worm-slide is removed, freeing the taper bore in the floating slide. Capacity is 4 to 24 or 36 in. centers. Full information is contained in a catalog, available from George Scherr Co., Inc., 200 Lafayette St., New York 12, N. Y.

T-38-12





### "Sine-Line" Checking Fixture

Michigan Tool Company, 7171 E. McNichols Rd., Detroit 12, Mich., announces Universal "Sine-Line" checking fixture Michigan Model 471-A, designed for checking gears, gear blanks, worm blanks, milling cutters and form tools up to 10 in. O.D. and 8 in. maximum face width.

With the various indicator assemblies available with the machine, this single fixture is claimed to accurately check tooth spacing, pitch radius, concentricity and taper of spur and helical gears, plus parallelism and crowning of spur gears.

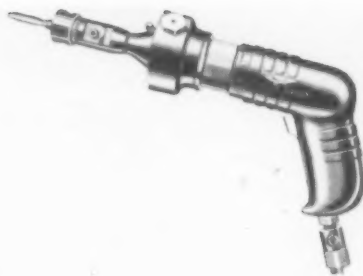
A precision tool, the fixture may further be used to check flute spacing, radial or off-center sharpening, depth of form, parallelism and form relief on formed cutters, as well as for essential checking of hobs. **T-39-12**

### Cross Transfer-Matic With Material Handling Features

The trend toward reduction of material handling as a means of lowering production costs is well illustrated by a special machine tool recently completed by the Cross Co., of Detroit. This Transfer-matic—the Cross Company's name for its special machine equipped with a continuous automatic material handling device—simultaneously performs 14 operation on a total of 28 transmission gear shift housings. Production is said to be 175 pieces per hour at 80% efficiency, with only one operator.

A minimum of physical and mental effort is required on the part of the attendant, who merely pushes the control button when the machine takes over, automatically transferring, locating, clamping, and machining the parts progressively, two at a time.

Flexibility for seasonable part changes is provided through use of standard Cross units. The interchangeability of these self-contained units is combined with easy accessibility of wearing parts to assure low maintenance and minimum down time. **T-40-12**



### "Push-Pull" Tappers by Aro

"Push-Pull" Tappers, added to the line of portable air tools manufactured by the Aro Equipment Corporation, Bryan, Ohio, are designed to provide the advantages of easier portable tapping operations as well as re-tapping, chasing and cleaning of tapped holes.

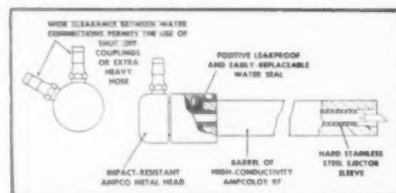
These tappers are automatically reversible; the operator merely pushes the tool for forward rotation, and pulls for reverse. They are offered in twelve models with speed range 450, 750, 1100, and 2500 R.P.M., and are suitable for all tapping operations up to 1/4 in. capacity in 1/8 in. sheet steel and cleaning up to 3/8 in. tapped holes.

Important features include higher torque, provided by a secondary planetary gear system supplementing the Aro "O" series motor; variable speeds for maximum efficiency in a wide variety of metals; three types of tool control—pistol type, button and lever—offering throttle selection to suit the operator and the specific job; simplified tap changing and adjusting by means of the new type of Jacobs tapping chuck; and trouble-free reversing mechanism. **T-41-12**

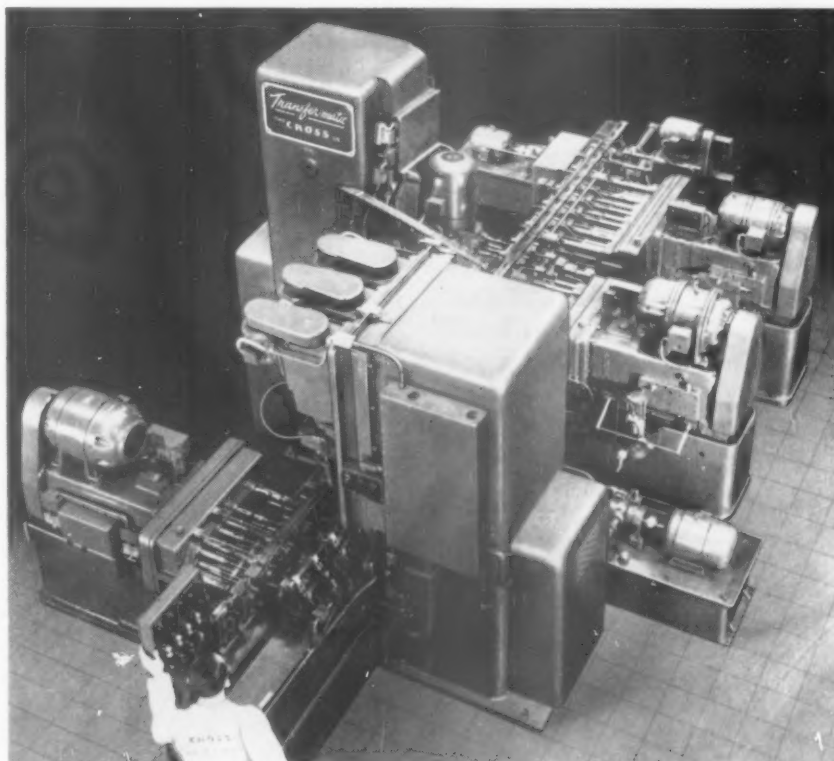
For more  
Information  
on products reviewed  
in this section, turn to  
page 72, for handy, keyed  
return form.

### Water-Cooled Ejector Holder

A water-cooled ejector type Holder for spot welder tips, announced by the Resistance Welding Department of Ampco Metal, Inc., Milwaukee 4, Wis., is said to have been proven to be trouble-free under practical operating conditions. Welder tips are ejected easily with a light tap on the head, allowing quick replacement.



A feature of the new holder is a positive leak-proof and easily replaceable water seal of Sirvene rubber. The head is of impact-resistant Ampco Metal, an aluminum-bronze alloy. The ejector sleeve is stainless steel and the barrel is constructed of Ampcoloy 97, a high conductivity alloy. Water connections are set at an angle with sufficient clearance to permit the use of shut-off couplings or extra heavy hose. **T-42-12**





# Use This Coupon for Complete Information On Tools of Today Items Featured This Month

Tools of Today Department, THE TOOL ENGINEER  
550 West Lafayette Blvd., Detroit 26, Michigan

For your convenience, a key number follows the announcement of each product reviewed in the *Tools of Today* section of THE TOOL ENGINEER. To obtain complete information on any of these products, circle the corresponding key numbers on this coupon, and mail the coupon to THE TOOL ENGINEER.

Gentlemen:

Please send me further information on the following Tools of Today items which I have checked:

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T-12-21 T-12-22 T-12-23 T-12-24 T-12-25 T-12-26 T-12-27 T-12-28 T-12-29 T-12-30  
T-12-31 T-12-32 T-12-33 T-12-34 T-12-35 T-12-36 T-12-37 T-12-38 T-12-39

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## 60 YEARS MANUFACTURING

Multiple Spindle Drilling and Tapping Machines—Automatic Drilling and Tapping Units—Multiple Spindle Attachable Drill Heads—Hot and Cold Swaging Machines—Hammering Machines—Tools, Jigs & Fixtures—Contract Work—Special Machinery.

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## LESS OPERATIONS AND BETTER WORK

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DUST PROOF



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Originators of Rotary Jig & Pilot Bushings

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## ROUND-CHATTERLESS-SMOOTH

GATCO Rotary jig and pilot bushing is built for core drilling, diamond boring, turret tool piloting, piloting hollow mills, line reaming, carbide boring, spot facing, etc.

## Get STANDARD TAPERED END MILLS on the job Fast!

50 standard sizes of spiral tapered end mills for milling taper or clearance on dies, molds or patterns — or any machining where taper is needed.

Taper  $\frac{1}{2}^{\circ}$  to  $7^{\circ}$  per side, flute lengths  $\frac{1}{2}''$  to  $3\frac{1}{2}''$ . Also special die sinking cutters.

Regular end mills in 2, 3, 4 flute. Get our price and delivery on specials.

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## DYKEM STEEL BLUE

## STOPS LOSSES

making dies & templates

Simply brush on right at the bench; ready for the layout in a few minutes. The dark blue background makes the scribed layout lines show up in sharp relief, and at the same time prevents metal glare. Increases efficiency and accuracy.

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THE DYKEM COMPANY, 2303D North 11th St., St. Louis 6, Mo.  
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In your plant . . . on your products —

USE THESE  
NEW

# "LOGAN"

## AIR CONTROL VALVES

- ★ NEW, IMPROVED CONSTRUCTION
- ★ EVERY TYPE OF CONTROL
- ★ 79 MODELS — COMPLETE SIZE RANGE

This new, complete line of piston-type air valves offers the most convenient, most efficient control for each of your problems. 79 models are now available in a broad range of sizes, for use in your own manufacturing or processing operations . . . for replacement . . . for original installation in the air-operated equipment you market. Here are some of the advantages:

**EFFORTLESS CONTROL**—Balanced design—valves do not operate against air pressure.

**INFREQUENT MAINTENANCE**—No rod packing or valve seats to become worn. Self-cleaning.

**POSITIVE ACTION**—Pistons have long-life synthetic cup packings to prevent leakage.

**SIMPLE INSTALLATION**—Compact design permits use in limited space and close to other equipment.

**EASY TO RECONDITION**—No need to disturb air line connections when replacing cup packings. After top or end cover screws are taken out, piston is quickly removed and replaced.

Use these new Logan Air Valves for manual or foot, remote, semi-automatic, automatic, time delayed, interlocking or sequence control systems. Get positive, trouble-free operation in controlling air cylinders and other air-operated equipment. Take advantage of the improved Logan Air Valve design in your plant and on your products. Investigate today.

### FREE ENGINEERING SERVICE

Ask Logan engineers for valuable assistance in designing complete air circuits and selecting effective types of equipment. No obligation.

# Logan

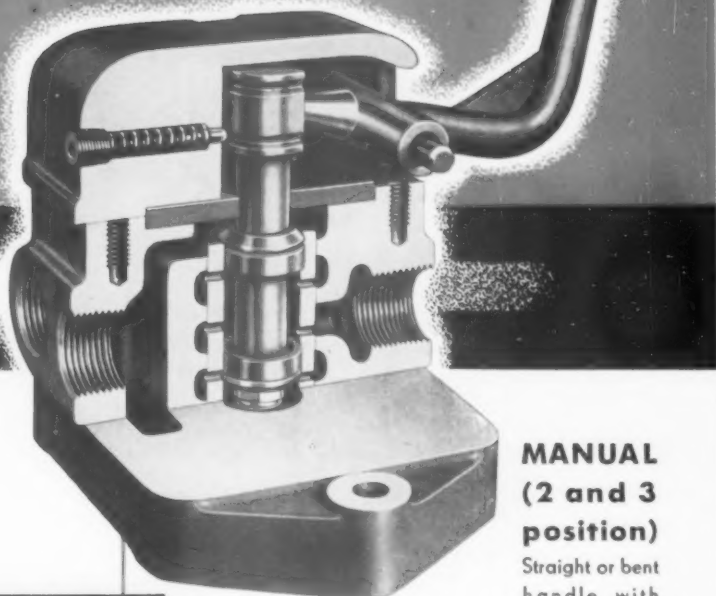
SAVES  
★ TIME  
★ EFFORT  
★ MOTION

*Air and Hydraulic Equipment*

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INDIANA

CHECKS • CYLINDERS • VALVES • PRESSES • SURE-FLOW COOLANT PUMPS



### MANUAL (2 and 3 position)

Straight or bent handle with

spring return to top or bottom, or ball detent. Foot, manifold or flange (recessed) mounting.

### DIRECT OPERATED

### FOOT (latching and direct control)



### CAM



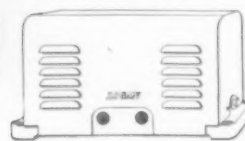
### LIGHT DUTY (1/4" ports)



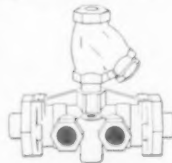
Operated by push button, palm button, toggle, cam or built-in air cylinder.

### REMOTE OPERATED

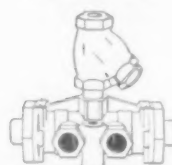
### ELECTRIC (direct-acting)



Valve piston operated by lever from solenoid. Controlled by push button or limit switch.



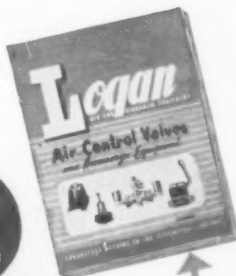
### BLEEDER

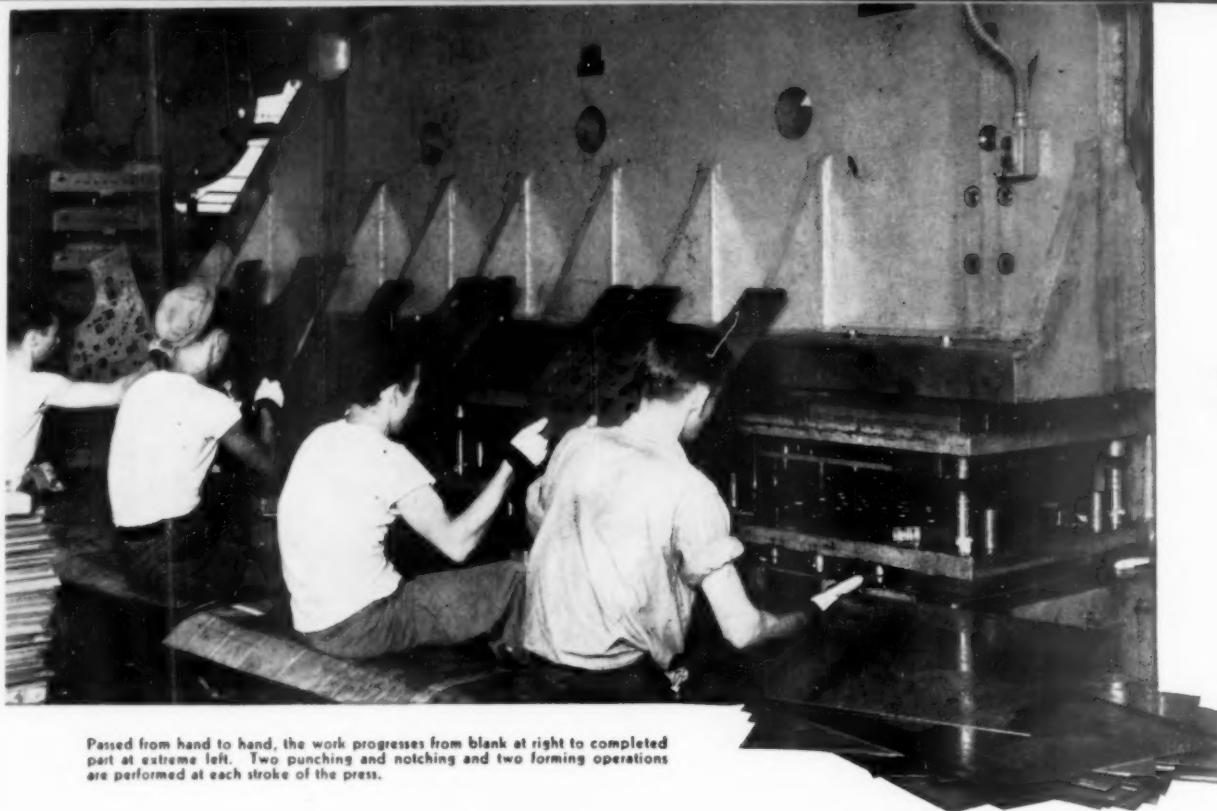


Controlled by remote 2-way bleeder and 3 or 4-way pilot operating valves, with operation by hand, foot, toggle, cam, electric switch or built-in air cylinder.

### PILOT PRESSURE (2 and 3 position)

WRITE FOR  
THIS NEW  
CATALOG





Passed from hand to hand, the work progresses from blank at right to completed part at extreme left. Two punching and notching and two forming operations are performed at each stroke of the press.



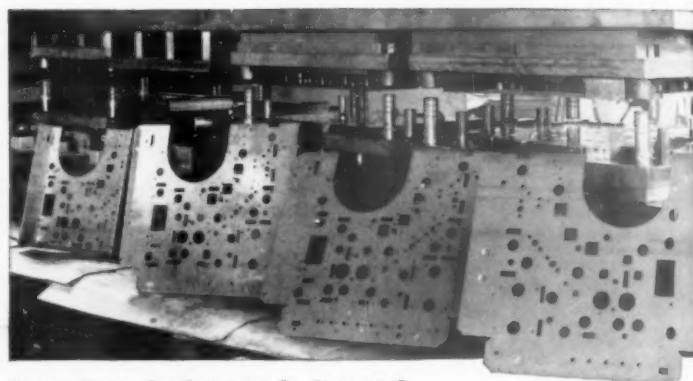
# OPERATION TELEVISION...

This television chassis, a modern product made in the modern manner on a Cincinnati Press Brake, is produced from blank to completion in one stroke—four simultaneous operations on one machine.

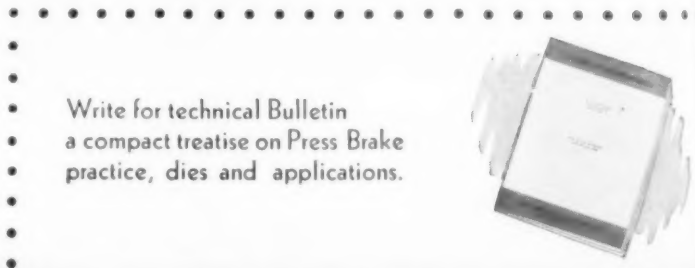
281 holes, tabs and notches are punched, and three sides are formed at each stroke—to close tolerances.

Cincinnati wide beds and rams—either fixed or detachable—for large area work, are highly productive on jobs of this kind.

You may find you can do it for less on a Cincinnati Press Brake.



Photos—Courtesy Rex Engineering Co., Cincinnati, O.



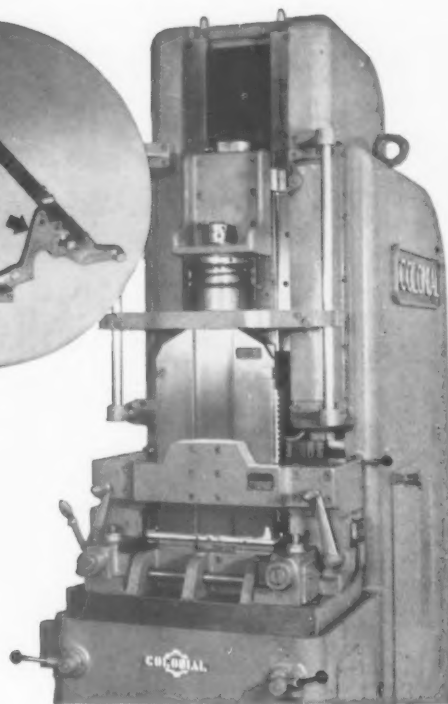
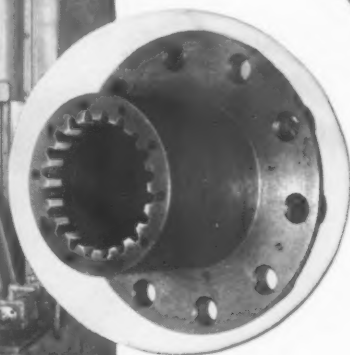
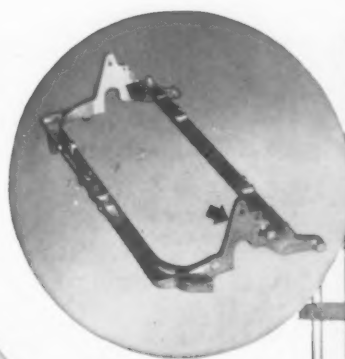
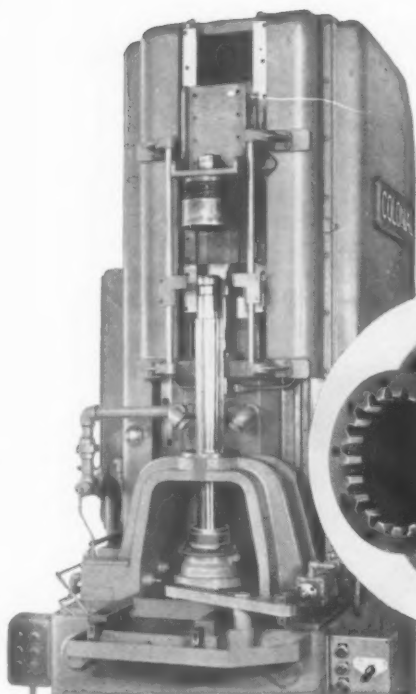
Write for technical Bulletin  
a compact treatise on Press Brake  
practice, dies and applications.



## THE CINCINNATI SHAPER CO.

CINCINNATI 25, OHIO U.S.A.  
SHAPERS · SHEARS · BRAKES





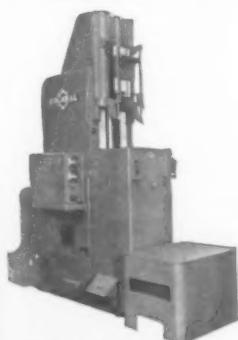
## HEAVY STEEL WHEEL HUBS --- or --- LIGHT WEIGHT TYPEWRITERS

*They're all the same to versatile  
high speed Colonial Broaching Machines*

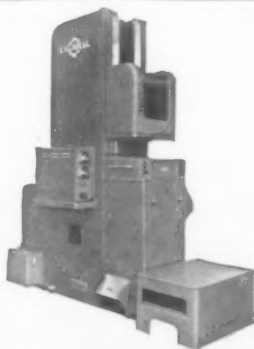
Shown here are two Colonial Pull-down broaching machines. They're fundamentally alike, but one has the job of broaching 8-pitch splines in a forged steel wheel hub, while the other broaches the inside faces of lightweight aluminum typewriter carriage frames. Automatic broach handling, complete guiding of broaches above and below the part, and high accuracy are characteristic of both of these standard Colonial machines. Of course there is a difference in machine capacities. One is a six, the other a 15 tonner. We'll be glad to tell you whether production cost of your parts can be cut and output rate increased on one of these or other types of the latest Colonials.



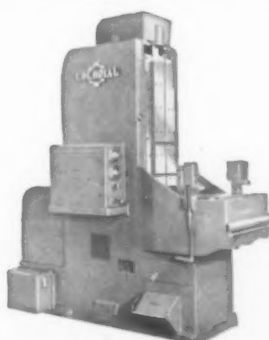
**Have you seen these new Colonials? Ask for Bulletins describing them!**



INTERNAL BROACHING  
PULL-DOWN  
BULLETIN NO. RD-48



INTERNAL BROACHING  
PULL-UP  
BULLETIN NO. RU-48



SURFACE BROACHING  
SINGLE-RAM  
BULLETIN NO. RS-48

### ALSO:

Colonial Dual-Ram surface  
broaching machines, Broach-  
ing Presses and Universal  
Horizontal Broaching Machines.

ON YOUR TURRET LATHES AND SCREW MACHINES

# DOUBLE [ MAKE TWICE AS MANY ] PRODUCTION with R and L TOOLS . . .



In enough cases to make the proverbial Scotchman jump for joy, R and L Tools actually enable shops to double the number of pieces produced per hour. We know that this statement will be open to question. We'd like you to question it and ask for proof because we know that once you saw the versatility of R and L Tools and their many, many possible applications, you'll want to use them whenever possible on all your machines. As a starter, we suggest you write us now for the idea-packed R and L Booklet which shows many R and L set-ups which are doubling production capacity in other shops throughout the country.

*Here's proof of R and L versatility: Turning and forming special shape on end of part while drilling or reaming.*

*Production Records  
Always Tell  
the Wisdom of Tooling  
With R and L*

## R and L Tools

1825 BRISTOL STREET NICETOWN, PHILADELPHIA 40, PA.

### New! Carbide-Surface R and L Back Rest Holders



Simple design allows for convenient interchanging of the R and L carbide surfaced backrest or roller backrest. Built in three sizes— $\frac{5}{8}$ ",  $\frac{3}{4}$ " and 1" diameter shank—these dependable holders may be adjusted for diameters, within their respective ranges, to reduce chatter and insure accurate turning. Tool life is immeasurably extended as a result of the carbide surfacing.



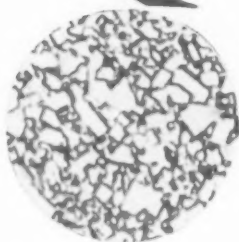
# Better Performance

... because of

*Better Structure\**

This Kennametal Style 11H90 Tool turns five of these semi-steel cast-iron cylinder liners compared to one with the carbide tool formerly used

It takes a hard, strong, sound tool material to remove 4,500 cubic inches of metal from five of these semi-steel cast-iron cylinder liners before regrinding—and then to repeat the performance after each resharpening, over the entire life of the tool.



\* Consistent soundness and uniformity of structure characterize all Kennametal compositions, as illustrated in the micrograph above (1500 times enlargement). Note absence of large grains, and virtual freedom from porosity.

All Kennametal compositions are much harder than the hardest tool steel, and the uniformity of hardness and strength of each grade comes from a consistently sound physical structure which is produced by distinctive processing, and precise, scientific methods of control.

The proof of the pudding is in the eating—service results prove that a carbide which gives superior service is that having uniform grain structure, and therefore consistently maintained hardness, strength, and wear-resistance. That's Kennametal.

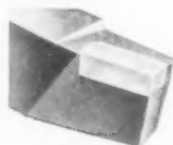
Equally important in cutting machining costs are Kennametal developments in mechanically-held tooling which further extend the profitable use and low-cost maintenance of carbide tooling. Kennametal tooling is completely-proved—can save money on 90% of your routine and unusual jobs. Ask our district engineer to demonstrate.



**KENNAMETAL Inc.**

**LATROBE, PA.**

**MANUFACTURERS OF SUPERIOR CEMENTED CARBIDES  
AND CUTTING TOOLS THAT INCREASE PRODUCTION**



STYLE BL



STYLE C



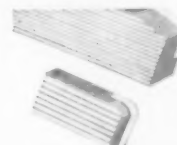
STYLE FL



STYLE GL

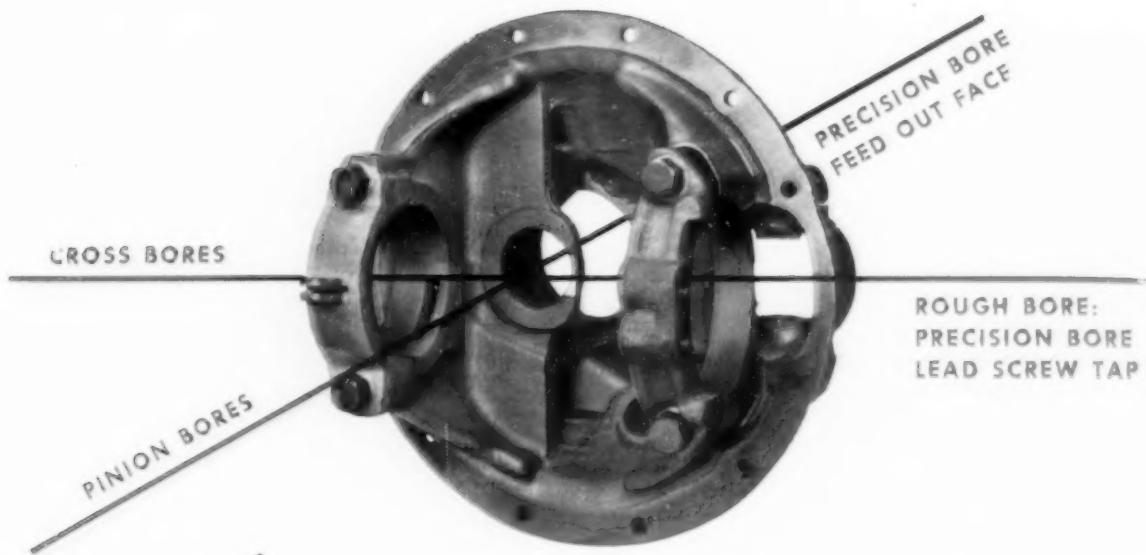


KENNAMETIC  
STYLE 12SK

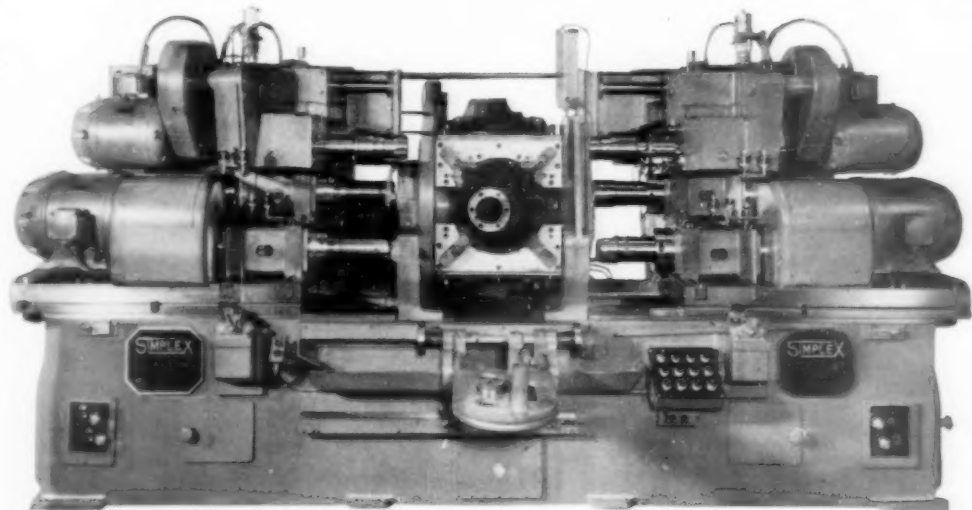


SERRATED MILLING  
CUTTER BLADES





MARKS THE SPOT WHERE *Precision Pays Off*



A Prominent Manufacturer of Axles greatly increased production, practically eliminated Axle tear down after assembly and lowered costs with these SIMPLEX 3-way Precision Boring Machines. A four-position indexing fixture permits loading on Station No. 1; Rough Boring Cross Bores on Station No. 2; Precision Boring Cross Bores, Pinion Bore and Feed Out Facing Pinion Bore on Station No. 3; Lead Screw Taping of Cross Bores on Station No. 4. A Production of 40 Carriers per Hour has been achieved on this large Truck type differential Carrier. Smaller Car Carriers would permit considerably higher production rates.

*Simplex*

## PRECISION BORING MACHINES

SIMPLEX MACHINE TOOL DIVISION

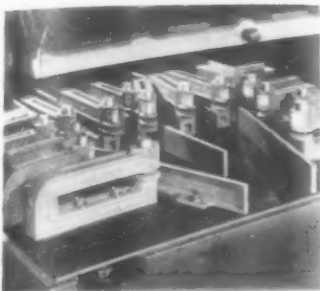
STOKERUNIT CORPORATION  
4528 WEST MITCHELL STREET

MILWAUKEE, WISCONSIN

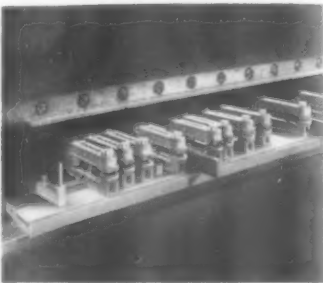
PRECISION BORING MACHINES • PLANER TYPE MILLING MACHINES • SPECIAL MACHINE TOOLS

# WALES HOLE PUNCHING EQUIPMENT

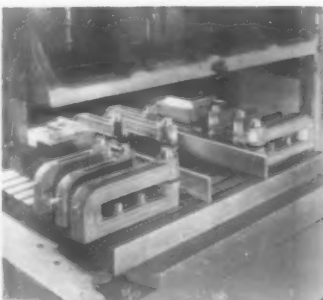
*- too big a story to tell on this page*



Wales Type "BL" Hole Punching Units set up on a mounting plate in stamping press.



The same Units, shown above in stamping press, set up in press brake on "Strip" Template.



A stamping press set up on T-slotted plate. Note nothing attached to press ram. Punches and dies are held in perfect alignment by self-contained holder.

**W**ALES Patented Equipment and Mounting Methods have made hole punching tooling a specialized application in the metal fabricating industry. The previously unheard of economies and efficiencies have resulted in hundreds of metal fabricators standardizing

on Wales Equipment for punching holes in angles, channels and sheets. The story is too big to tell on this page. Write on company stationery for fully-illustrated, functionally-colored, 32-page Catalog BL loaded with typical setups and setup methods.



## A WORD ABOUT WALES SERVICE ENGINEERS WHO CALL ON YOU

Wales Service Engineers are specialists in hole punching and notching,—selling no other line of equipment. Many of these Service Engineers have had several years experience in the engineering and production departments at the Wales-Strippit plant. They know from experience what Wales Equipment will do for you. These Service Engineers are as valuable to you as the Wales Equipment. Call them in for suggestions.

## WALES-STRIPPIT CORPORATION

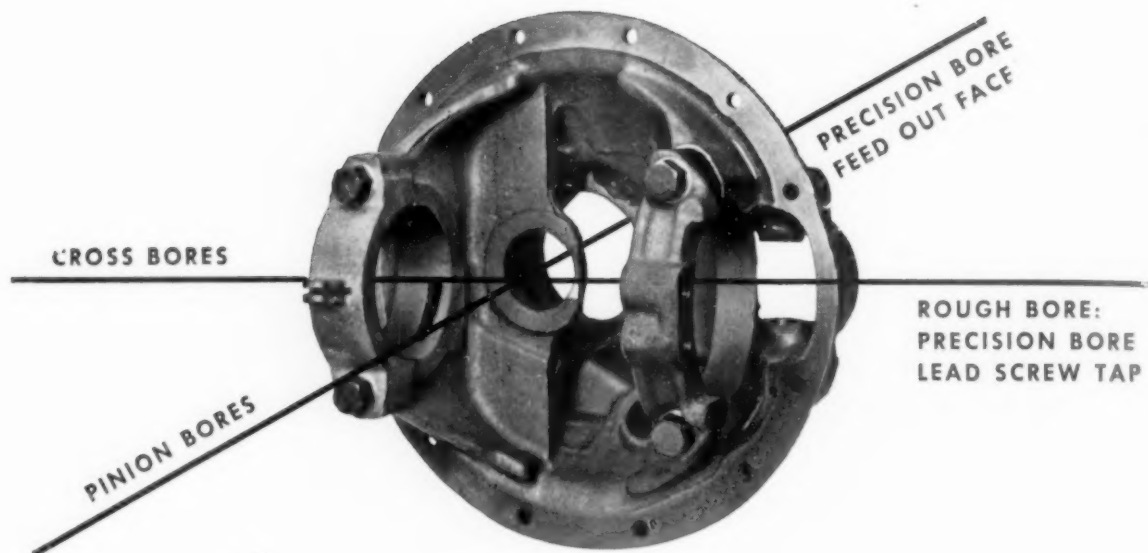
GEORGE F. WALES, President

393 PAYNE AVENUE, NORTH TONAWANDA, N. Y.

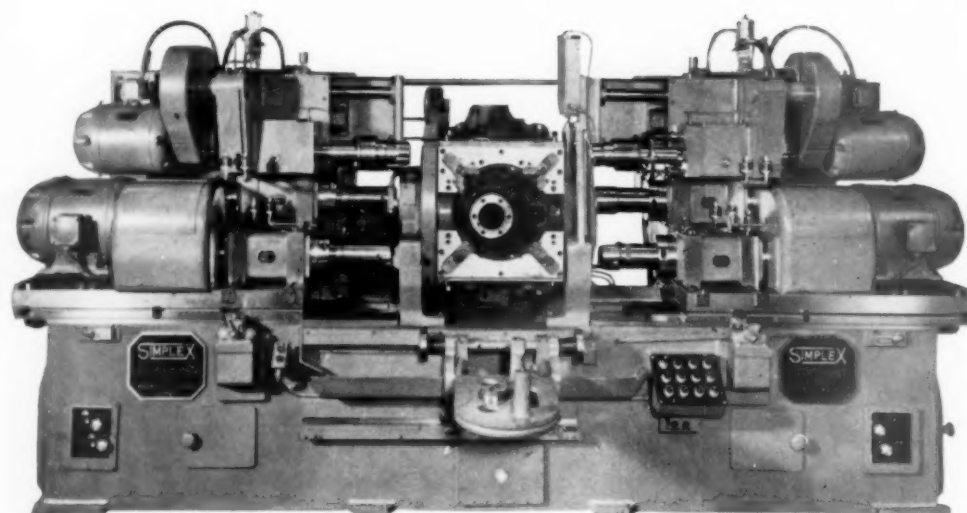
(Between Buffalo and Niagara Falls)

WALES-STRIPPIT OF CANADA LTD., HAMILTON, ONTARIO

*Specialists in Punching and Notching Equipment*



MARKS THE SPOT WHERE *Precision Pays Off*



A Prominent Manufacturer of Axles greatly increased production, practically eliminated Axle tear down after assembly and lowered costs with these SIMPLEX 3-way Precision Boring Machines. A four-position indexing fixture permits loading on Station No. 1; Rough Boring Cross Bores on Station No. 2; Precision Boring Cross Bores, Pinion Bore and Feed Out Facing Pinion Bore on Station No. 3; Lead Screw Taping of Cross Bores on Station No. 4. A Production of 40 Carriers per Hour has been achieved on this large Truck type differential Carrier. Smaller Car Carriers would permit considerably higher production rates.

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## PRECISION BORING MACHINES

SIMPLEX MACHINE TOOL DIVISION

STOKERUNIT CORPORATION  
4528 WEST MITCHELL STREET

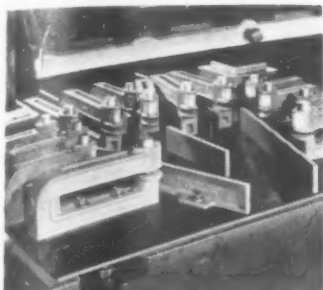
MILWAUKEE, WISCONSIN

PRECISION BORING MACHINES • PLANER TYPE MILLING MACHINES • SPECIAL MACHINE TOOLS

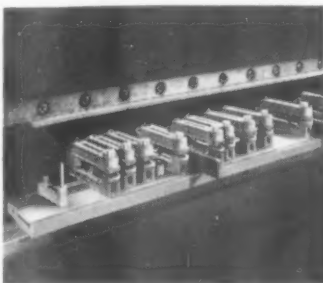


# WALES HOLE PUNCHING EQUIPMENT

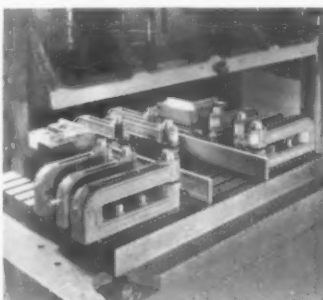
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GEORGE F. WALES, President

393 PAYNE AVENUE, NORTH TONAWANDA, N. Y.

(Between Buffalo and Niagara Falls)

WALES-STRIPPIT OF CANADA LTD., HAMILTON, ONTARIO

*Specialists in Punching and Notching Equipment*

WINTER BROTHERS TAPS ARE DEPENDABLE



Winter Hand Taps are designed for general purpose work, and are made in taper, plug, and bottoming types. Other Winter Taps include Chip Driver, Machine Screw, Nut, Tapper, and Pipe styles.

## MANUFACTURING PROCEDURE

More than modern equipment and good materials are needed to make taps of Winter dependability. Equally critical is the ability to combine the various manufacturing steps into one efficient whole. Winter engineers have more than 47 years' experience in tool design and manufacture. This engineering knowledge, combined with the facilities of a new and modern plant, helps build dependability into Winter Taps and Dies.



### *Always at Your Service*

YOUR LOCAL DISTRIBUTOR carries a complete stock of Winter Taps on his shelves—as close to your tapping problems as the telephone on your desk.

# Winter Brothers COMPANY

ROCHESTER, MICHIGAN, U.S.A. • Distributors in Principal Cities • A Division of the National Twist Drill and Tool Company • Branch Stores: New York, Chicago, Detroit, San Francisco.



PERFORMANCE IS BUILT INTO NATIONAL METAL CUTTING TOOLS

## SELECTION OF RAW MATERIALS

National makes a complete line of standard and special Reamers, including taper and chucking Reamers in high speed and carbon steel, and shell types in high speed steel only. Other National tools include Twist Drills, Counterbores, Milling Cutters, Hobs, and End Mills.



### *Call Your Distributor*

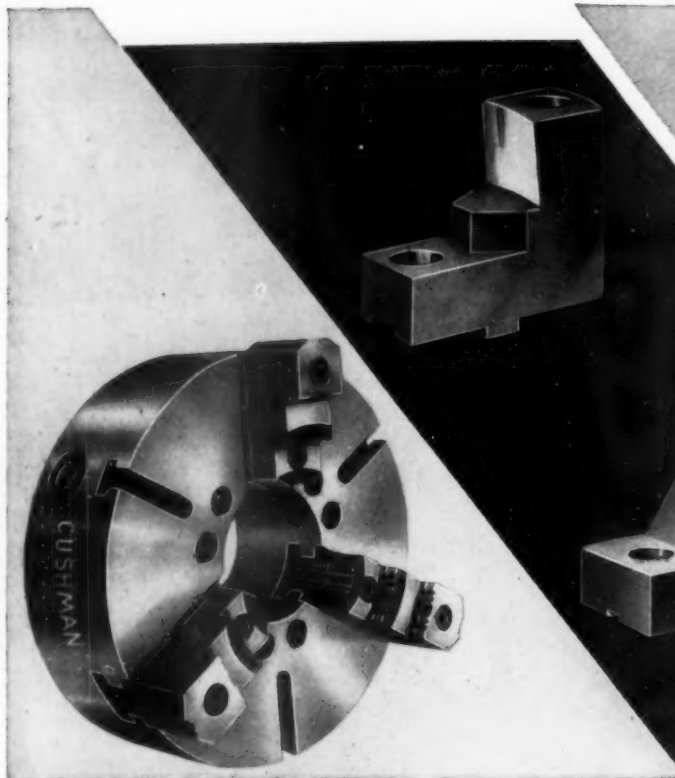
LEADING DISTRIBUTORSEVERYWHERE offer complete stocks of NATIONAL Cutting Tools. Call them for cutting tools or any other staple industrial product.

Every bit of steel that goes into National Cutting Tools is rigidly inspected and tested. At the same time, National conducts its own research into the properties of new steels as fast as they are developed. For example, the qualities of hardness and toughness, as related to tool life, are special subjects of National's raw material studies at all times. Methods like these build better performance into National Cutting Tools.

**NATIONAL** *TWIST DRILL AND TOOL COMPANY*  
ROCHESTER, MICHIGAN, U. S. A. Tap and Die Division—Winter Bros. Co.  
Distributors in Principal Cities • Factory Branches: New York • Chicago • Detroit • Cleveland • San Francisco







Are you enjoying the broad  
cost saving possibilities  
of American Standard

2-piece  
**JAWS**  
?

**...on your light to medium duty  
production machinery**

Medium Duty 3 or 4-piece Cushman Chucks with American Standard 2-piece jaws are the ideal equipment for your tool room lathes, your general purpose lathes and the great majority of lathes in your production departments. Because, with this type of jaw, you remount the top jaws when changing from one form of work piece to another... rather than using expensive work holding fixtures.

With this type of jaw equipment you can make full use of soft blank top jaws. These can be formed to hold all kinds of irregular shaped work pieces. And the cost will be far less than for special face plates

or fixtures. With Cushman high standards of precision in chuck manufacture you can depend upon the accuracy of these set-ups for your most exacting work.

Our Engineering Department will be glad to give you further information and help on your own particular problems. Write us, without obligation.

**THE CUSHMAN CHUCK CO.**  
Hartford 2, Conn.

Comprehensive Series of  
**CUSHMAN POWER CHUCKS**  
and  
**AIR CYLINDERS**  
are now available.  
Write for Catalog PO63 and Bulletins

Consult  
**CUSHMAN**

*Chucking Engineers Since 1862*

# Speed Burring Jobs with OILSTONE FILES



## Grinding Wheel Grit . . . and ALL File!



Whether it be the skillful stoning of the countless teeth in these giant reduction gears or single-stroke passes on thousands of small machined parts — burring is a production operation — its cost, a production cost.

India Oilstone files, by Norton Abrasives, speed burring jobs — with a corresponding cut in production cost — for two reasons. They are made of aluminum oxide, grinding wheel abrasive, and they're all file — not just rows of cut teeth. They cut hardened steels as well as untreated, and permit easier control of stock removal.

Factory oil-filled for greater chip clearance, India Oilstone files offer Industry a complete size and shape range of over a hundred standard stock items with a finish spread including coarse, medium and fine grits. Ask your distributor or write for booklet, "Oilstone Files."

*Photo courtesy of Westinghouse Electric Corp.*



**BEHR-MANNING • TROY, N. Y.**

ALSO QUALITY COATED ABRASIVES SINCE 1872

# Even Doughnuts Are Improved

## by **SUNNEN HONING**

**Ability to hold .0002" Tolerance  
Ended Air Leakage Between These  
Doughnut Cutter Parts**



Material — Seamless  
steel  
Hole size — from 1" to  
2 3/4" dia.  
Hardness — 35 Rock-  
well C (approx.)  
Stock removal — .003"  
Production rate — 20  
cutters per hour

**... at Doughnut Corp. of America,  
Ellicott City, Md.**

The air seal in this doughnut cutter assembly is extremely important. Air leakage would allow dough to be forced between these mating parts — and cause a shutdown of the doughnut machine.

SUNNEN HONING produced a straight, round hole in this thin-walled cutter — accurate within .0002" — with an extremely fine surface finish.

The doughnut production problem was solved. In addition, the Sunnen honed parts last longer, and the doughnut machines are more efficient.

### **SUNNEN PRODUCTS COMPANY**

7948 Manchester Avenue • Saint Louis 17, Missouri

Canadian Factory: Chatham, Ontario



### **SUNNEN PRECISION HONING MACHINES ARE LOW IN COST AND EXTREMELY VERSATILE**

- Hone Any Diameter from .120" to 2.625"
- Hone Any Metal — steel, cast iron, bronze, aluminum, as well as glass, ceramics, plastics
- Produce Any Surface Finish Required
- Produce Straight, Round Holes — accuracy guaranteed within .0001"

Investigate the money-saving possibilities of Sunnen Honing in your plant. WRITE FOR BOOKLET MAN-5 or, on request, a Sunnen Engineer will be glad to call.

# **SUNNEN HONING**

**"Low-cost production of precision holes"**



# COSTS DROP... OUTPUT SOARS

when you use **SCULLY-JONES**

## COUNTERBORING and COUNTERSINKING TOOLS



Scully-Jones Style "B"  
Counterbore Driver with  
interchangeable H.S.S.  
Cutter and Pilot.



Scully-Jones Adjustable  
Stop Collar Counterbore  
Driver, Ball Bearing  
Type. Also available  
in Solid Type.

Scully-Jones Style "B"  
Pilots of high grade steel,  
hardened and ground.

**Save Set-Up Time**—You can quickly—easily insert and eject these Counterbores and Countersinks because of their simple Stub Taper Shanks.

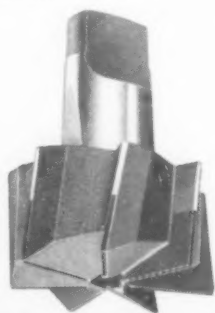
**Maintain Precision Tolerances: Have Fewer Rejects**—You can machine pieces to close tolerances and get the finish required by using Scully-Jones Counterbores and Countersinks because their Stub Taper Drive, designed for maximum rigidity and concentricity, assures a true running cutter.

**Keep Inventory Low: Meet Production Requirements**—Because we can fill your orders immediately from stock of all popular styles and sizes.

**Increase Output**—You will have less "down" time; your machines will stay on the job longer—turn out more products with these tools—because they are built to our high quality specifications, from carefully selected steels or alloys, designed to stand up under today's high speed production methods.

*For quickly obtaining complete information on our line of these tools, see pages 164 through 173 of Scully-Jones Engineering Manual 500.*

Scully-Jones Style "B" Counterbore Cutter, Tungsten Carbide Tipped. Also available in High Speed Steel.



Scully-Jones Style "B" Countersink, Tungsten Carbide Tipped. Also available in High Speed Steel.



**Scully-Jones**  
AND COMPANY

1915 SOUTH ROCKWELL STREET, CHICAGO 8, ILLINOIS

**YOU GET LOW COST, FAST, ACCURATE PRODUCTION WITH OUR STANDARD AND SPECIAL TOOLS**

Behind every manufactured product  
is the tool engineer  
Behind every tool engineer  
is Milne Tool Steel

## A. MILNE & CO.

(ESTABLISHED 1887)

*Save Hours of Machining Time by Using*

## MILNE HOLLOW DIE STEELS

*Send for new Catalog Section on these Steels*

ALSO SEND FOR YOUR COPY OF OUR  
COMPLETE NEW CATALOG JUST PUBLISHED

### TIMKEN GRAPHITIC STEELS

*Send for your copy of the newly printed 9TH EDITION*

*Our Seven Warehouses are located:*

- New York 14, 745 Washington St.
- Boston 27, 631 E. 1st St.
- Pittsburgh 12, 1000 Constance St., N.S.
- Cleveland 5, 11110 Avon Avenue
- Chicago 7, 17 N. May St.
- Philadelphia 6, 337-339 N. Orianna St.
- New Britain, 172 Stanley St.

*and on the Pacific Coast:*

*For the States of Oregon, Washington, Idaho  
and Montana*

Pacific Machinery & Tool Steel Co.  
630 S.E. Belmont Street  
Portland 14, Oregon

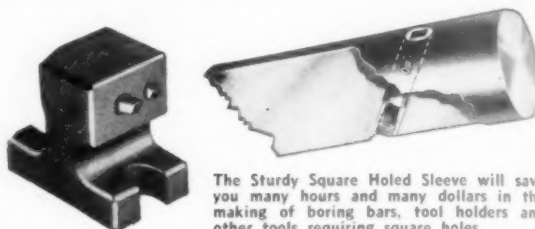
## America's Leading Tool Steel Specialists

## How SQUARE HOLED SLEEVES SPEED UP TOOL-MAKING!



Patents Pending

One of the most difficult problems in tool making can be solved easily and quickly with Sturdy Square Holed Sleeves. The perfection of broached square holes can be had in boring bars, milling cutters and many other applications at a small fraction of the cost of imperfect hand-made square holes. The Sturdy Square Holed Sleeve consists of a round sleeve with a perfectly square hole broached through the center. This hole is tapped at one end to receive a back-up screw which is furnished with the Sleeve. The Sleeve can be sweated or pressed into a drilled and reamed hole to make a perfectly square accurate hole in a very few minutes.



The Sturdy Square Holed Sleeve will save you many hours and many dollars in the making of boring bars, tool holders and other tools requiring square holes.

BUSHINGS MADE IN FOLLOWING SIZES:  
3/16, 1/4, 5/16, 3/8, 7/16, 1/2, 5/8, 3/4, 1"

Some Territories Still Open to Jobbers

STURDY BROACHING SERVICE  
23520 TELEGRAPH RD., DETROIT 19, MICH.

*Write for  
Literature*

# SAWING

# FINISHING

# GROB

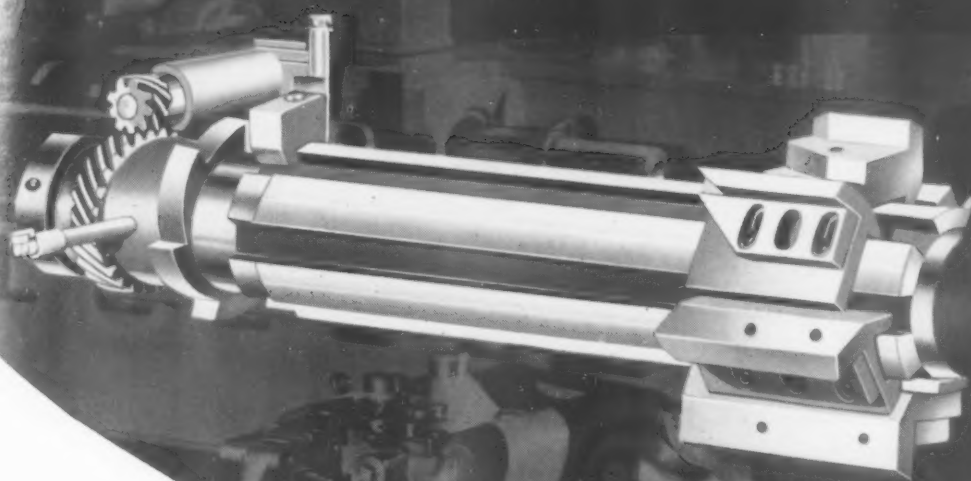
# BROTHERS

GRAFTON
WISCONSIN

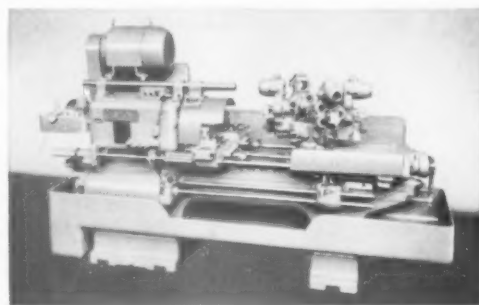
# **GISHOLT**

## ***Fastermatics***

**(AUTOMATIC TURRET LATHES)**



This simple control drum enables you to select the **BEST** feed for **EACH** cut because the Fastermatic provides infinite feed selection rather than limited and fixed gear ratios. Thus it makes feed selection efficient, quick and easy. Write for literature.



THE GISHOLT ROUND TABLE represents the collective experience of specialists in machining, surface-finishing and balancing of round or partly round parts. Your problems are welcomed here.

**GISHOLT MACHINE COMPANY**

Madison 10, Wisconsin

**Turret Lathes • Automatic Lathes • Superfinishers • Balancers • Special Machines**



# NEW GEAR SHAVING MACHINE

*Has far greater*

production possibilities

Gears may be shaved by any method you choose on the new Red Ring Universal Model GCY-8" and 12".

## conventional shaving

You can shave wide face gears by the conventional method of shaving, that is, when the gear is reciprocated across the cutter and parallel to its axis.

## diagonal shaving

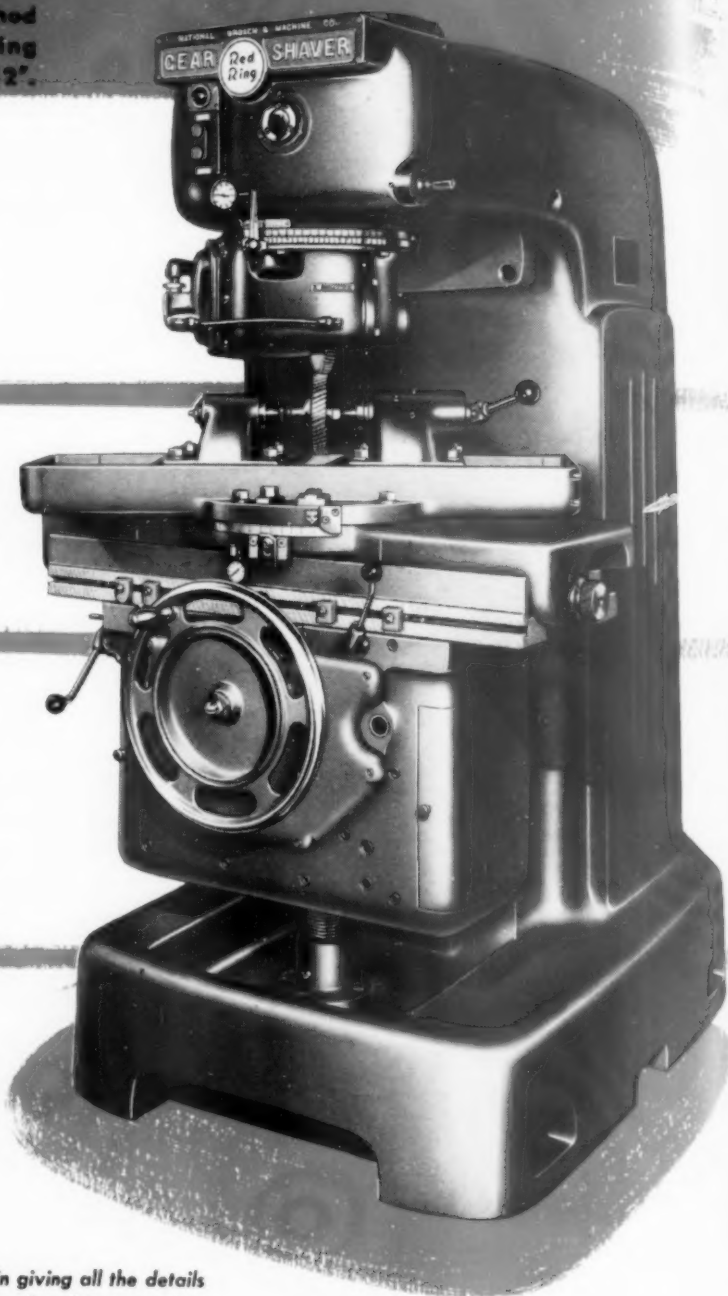
Or, you can shave the narrower face gears diagonally at much higher production rates and with considerably less cutter wear and less effort by the operator.

## elliptoid tooth form

You can give the gear teeth the perfect Elliptoid form (crowning by rocking the table) while they are being shaved by either method mentioned above and without the necessity of using specially formed cutters. Special cutters may be used, however, if desired.

## taper shaving

Likewise, gears may be taper-shaved by either the conventional or the diagonal method. This new machine is faster in operation and easier to load and unload than any of its predecessors.



Write for descriptive bulletin giving all the details of the new Red Ring Universal and its operation.

5003

**NATIONAL BROACH AND MACHINE CO.**  
5600 ST. JEAN . . . . . DETROIT 13, MICHIGAN

WORLD'S LARGEST PRODUCER OF GEAR SHAVING EQUIPMENT

# Threaded Holes FOR SALE!

Tap users rightly think in terms of the "cost per threaded hole".

Thus they get a true measure of tap value which is more than the cost of the tap itself. It includes getting the right tap for the job in the quickest possible time. It includes accuracy and long life of the tap while on the job.

Here are some of the PLUS values that are behind all taps with the GTD trademark:



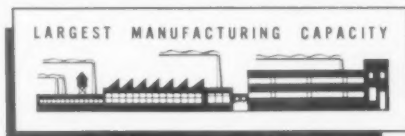
**SERVICE** from the country's leading distributors who handle "Greenfield" tools.



**ON-THE-SPOT HELP** on threading problems from the "Greenfield Man" in your territory.

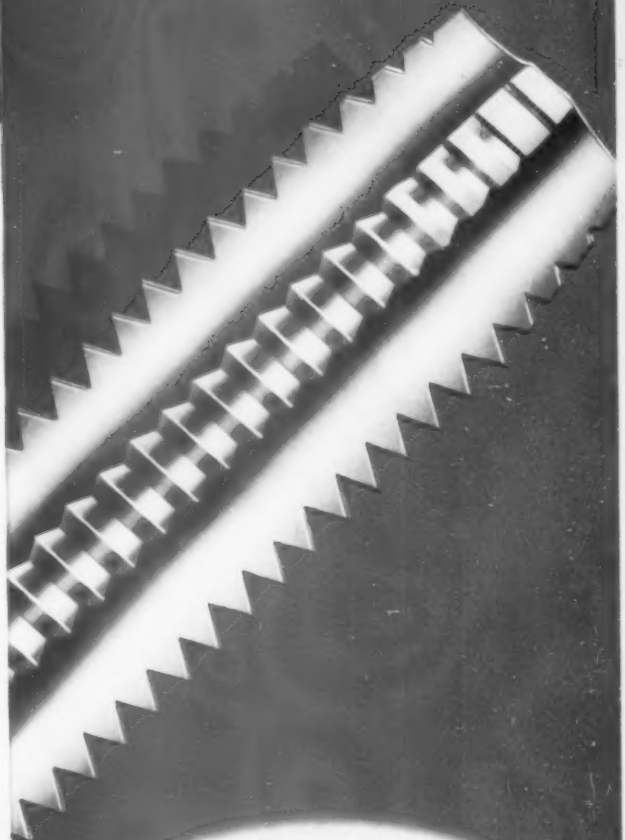


**BUILT-IN VALUES** that come from the industry's largest research staff of threading engineers.



**PERFORMANCE** that comes from a product made in the largest, most modern threading tool plant in the world.

*That's why . . . when you buy . . .  
you get more for your money when  
you say "Greenfield"*



**GREENFIELD**

*World's Leading*  
**THREADING  
TOOLS**

When you buy GTD "Greenfield", you get a quality of product that comes from the world's largest, most modern threading tool plant and its research staff of threading engineers—PLUS SERVICE from the leading distributors and GTD "Greenfield's" field men in every industrial center.

**GREENFIELD TAP and DIE CORPORATION**

GREENFIELD,  
MASSACHUSETTS

PRECISION MACHINES



PARKER • MAJESTIC



Since 1907, the name of Parker has been a part of the progress of the automobile industry.

In 1915, Parker introduced the basic principle of ball bearings in grinding manufacture—a major advance in grinding which was unknown at that time.

A few years later the Parker Ball Bearing was patented to meet high speed and precision requirements and has been in use ever since.

Further research and engineering development brought

forth the well-known Parker Majestic External and Internal Grinding Machines, each machine representing a great advance in simplicity of operation and precision.

The latest tooling development of the company is the Parker Majestic No. 2 Surface Grinder that provides new accuracy and flexibility for small grinding operations.

These many products of Parker Majestic will continue to serve the great automotive industry in the future, keeping pace with its demands for speed, accuracy and dependability.

MANUFACTURED BY

**MAJESTIC TOOL AND MANUFACTURING COMPANY**

147 JOS CAMPAU •

DETROIT 7, MICHIGAN



## A BUYING GUIDE FOR ABRASIVES

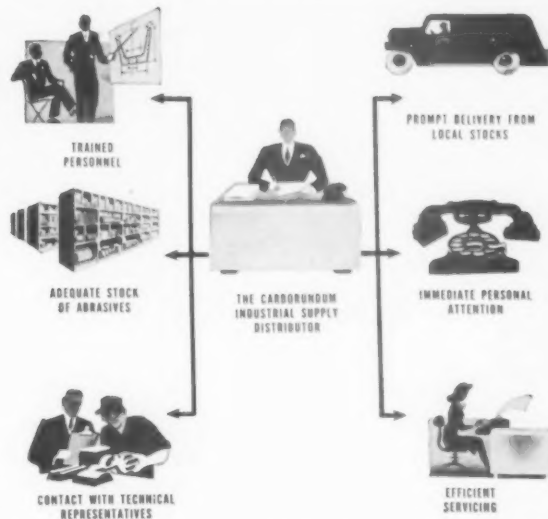
**ABRASIVE PROBLEM:**  
Where is there a convenient  
Source of Supply?

**ANSWER BY**  
**CARBORUNDUM**  
TRADE MARK

As an efficient and dependable source of supply, the services and facilities of your CARBORUNDUM distributor offer time and money saving advantages.

From large and varied stocks of abrasives located conveniently nearby, the products you need are available without delay. Plant inventories can be safely and economically reduced.

Frequent personal service by a trained and experienced local staff provides reliable facts and figures on abrasive applications and operations.



On difficult or unusual jobs, direct assistance from CARBORUNDUM representatives is available.

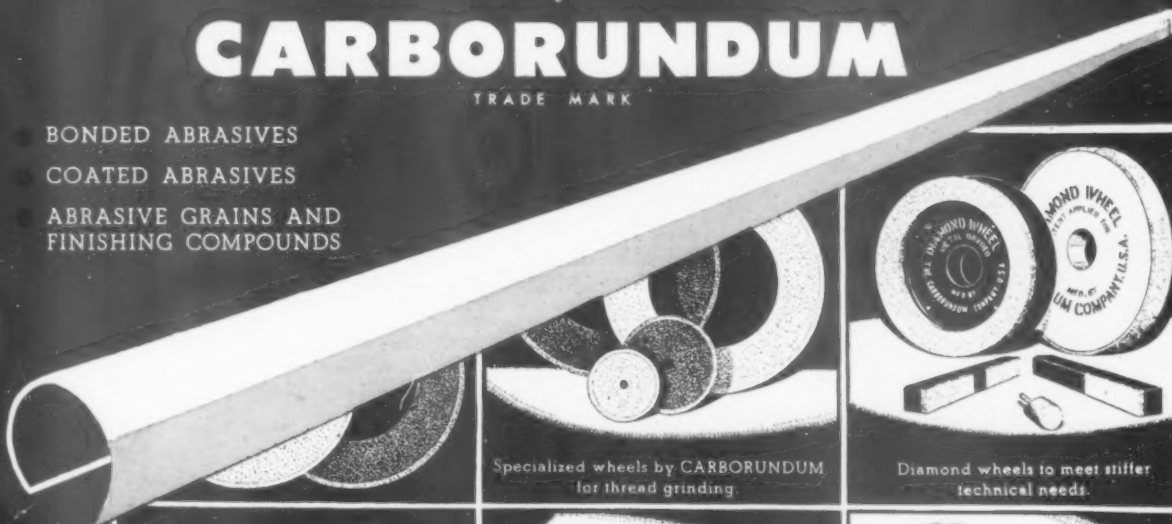
Simplified buying and other important savings realized from intelligent and efficient handling are creating an increasing preference for abrasives by CARBORUNDUM. The Carborundum Company, Niagara Falls, New York.

A Good Rule for Good Grinding...CALL IN

# CARBORUNDUM

TRADE MARK

- BONDED ABRASIVES
- COATED ABRASIVES
- ABRASIVE GRAINS AND FINISHING COMPOUNDS

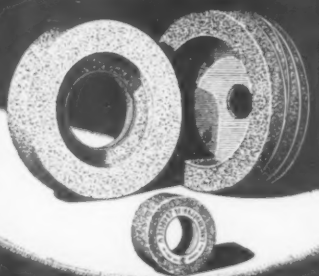


Specialized wheels by CARBORUNDUM  
for thread grinding.

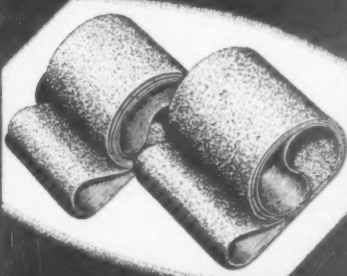
Diamond wheels to meet stiffer  
technical needs.



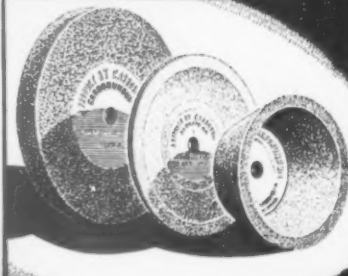
"Carborundum" is a registered trademark which indicates manufacture by The Carborundum Company.



Cool-cutting GREEN GRIT wheels for  
cemented carbide.



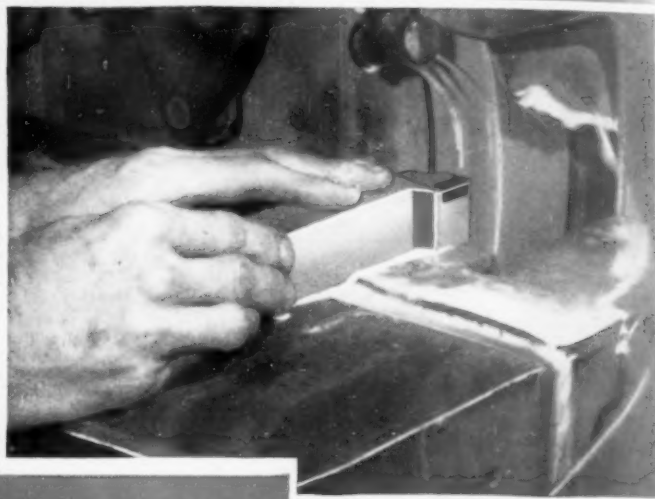
A coated abrasive for every  
sanding and finishing condition.



All standard shapes are supplied in  
grinding wheels by CARBORUNDUM.

## the grinding job

Off-hand sharpening of a carbide tipped tool, on 14" Hammond Tool Grinder. Widespread and increasing use of these tools makes this an important every day operation in many plants. Correct wheel selection for this specialized work is essential for efficient sharpening without damage to carbide tips.



## the wheel

G Electrolon, GC80-19-V3, 14" x 4" x 11", plate-mounted, Type PM, specially developed to prolong the efficiency of cemented carbide tools with economical grinding cost. Accepted as a standard of excellence throughout industry.



**Borolon** **Electrolon**  
ALUMINUM OXIDE SILICON CARBIDE

**SIMONDS**  
ABRASIVE CO.

PHILADELPHIA, PA.

## Grinding Wheels

Available Everywhere



## where to get it

Simonds Abrasive Distributors in all principal industrial centers in the U.S. and in many foreign countries carry stocks and can advise on grinding wheel selection. Write now for Bulletin ESA-181 "G Electrolon Wheels for Carbide Tool Grinding". Also request name of nearest distributor.

Every size and shape for every grinding job . . . centerless, crankshaft, cut-off, cylindrical, internal, knife grinding, mounted points, portables, roll grinding, saw gumming, snagging, surfacing (wheels and segments), tool and cutter, bricks, sticks, stones and abrasive grain for polishing, pressure blasting, anti-slip, etc.

**SIMONDS**  
ABRASIVE CO.  
Philadelphia, Pa.  
Grinding Wheels and Abrasive Products

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(CANADA ABRASIVE CO. LTD.)  
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STEEL MILLS  
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Special Steels

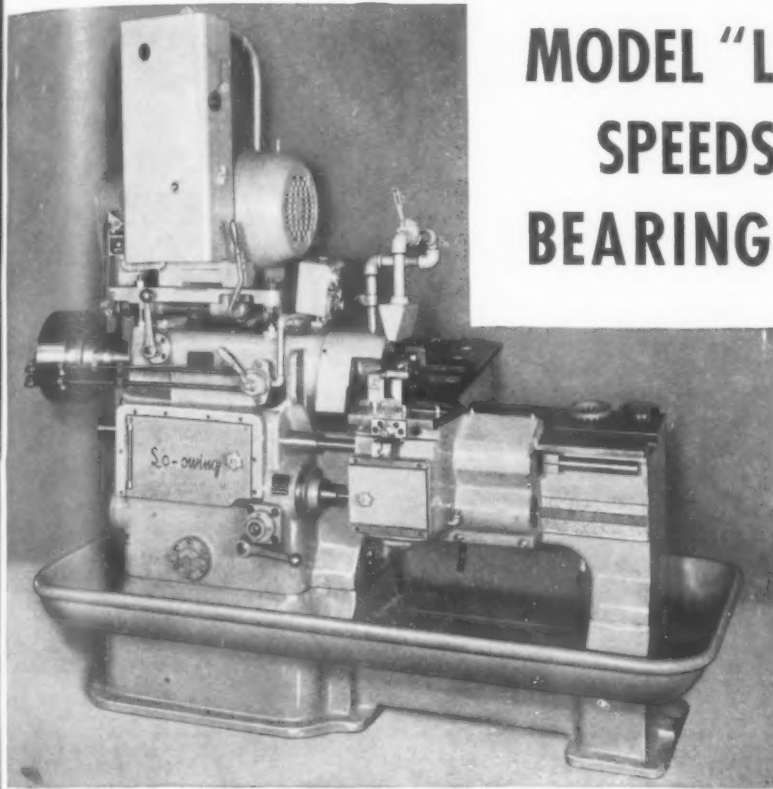
**SIMONDS**  
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Montreal, Can.  
Simonds Products for Canada

**S**imonds Abrasive Company, a major manufacturer of grinding wheels and abrasive products exclusively, maintains a modern electric furnace plant at Arvida, Canada. Here the crude abrasive used in making Simonds grinding wheels is produced. Thus, product quality is controlled from the source, assuring you of lasting performance, top efficiency, better economy when you use Simonds Abrasive wheels on your grinding jobs.

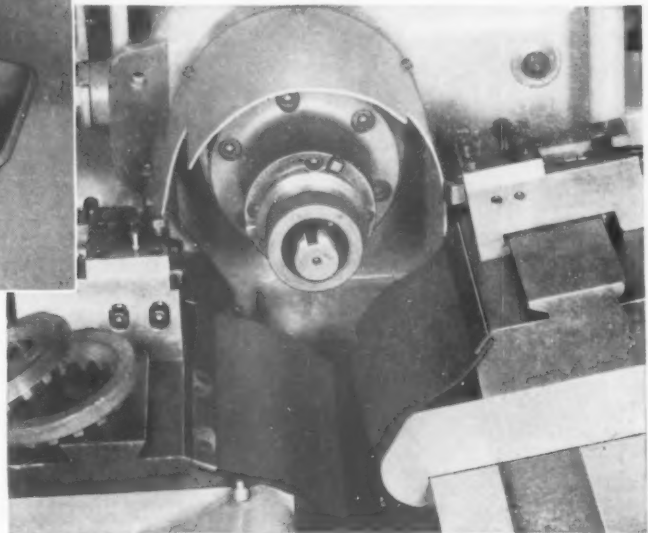
SIMONDS ABRASIVE COMPANY, PHILADELPHIA 37, PENNA. • DISTRIBUTORS IN ALL PRINCIPAL CITIES

# MACHINE OF THE MONTH

PREPARED BY THE SENECA FALLS MACHINE CO. "THE Lo-swing PEOPLE" SENECA FALLS, NEW YORK



## MODEL "LR" Lo-swing LATHE SPEEDS PRODUCTION OF BEARING ADJUSTING RINGS

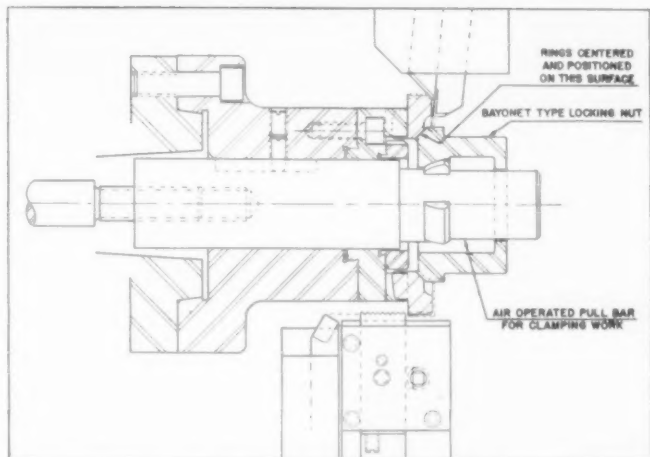


**Problem:** To turn, face, chamfer and thread Bearing Adjusting Rings in one operation.

**Solution:** The Model "LR" Automatic Lo-swing Lathe selected for this job is equipped with a special, double lead longitudinal feed cam permitting a carriage feed of .021" for the turning cycle while the balance of the cam path is cut to correspond to the number of threads per inch required on the outside diameter of the rings. The rings, delivered to the lathe without any previous machining, are mounted on a special, air-operated driver and held in position by the bayonet type locking nut shown in the line drawing. Rough and finished rings are shown in the close-up illustration.

The machining operation is fully automatic; the turning, facing and squaring tools first start cutting, after which the special threading tool, which has provision for height adjustment, cuts the thread to size. The carriage and slides return to the starting position in rapid traverse and the machine stops, ready for reloading. Production on a 4 $\frac{3}{4}$ " diameter ring is 63 pieces per hour at 85% efficiency.

Our Engineering Department is at your service to assist in developing machines and tooling engineered for your particular machining problems.

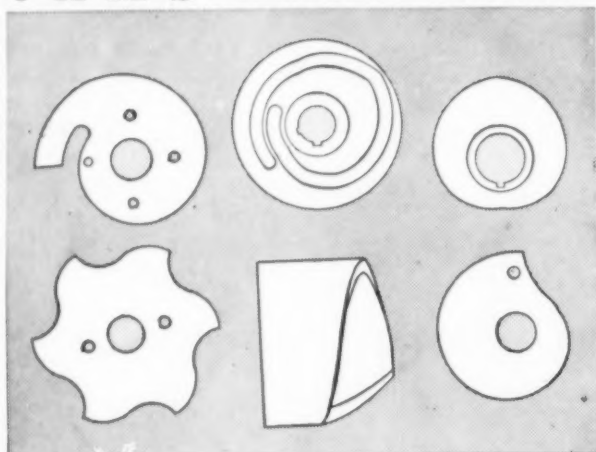


SENECA FALLS MACHINE CO., SENECA FALLS, N. Y.

PRODUCTION COSTS ARE LOWER WITH Lo-swing



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For years, the superior know-how of American Cam Company has maintained the reputation of producing the finest quality cams at the lowest prices in the quickest time. No quantity too large.

Also specialists in Cams and Layouts for BROWN & SHARPE Automatic Screw Machines.



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Yes, Carboloy Diamond Dressers have a degree—a greater degree of usefulness than you've ever seen in any other dresser. Why? Because of their

### "EDUCATED DIAMONDS"

They stand abuse . . . and can't come loose!

A matrix of Carboloy Cemented Carbide holds them fast for a longer, more useful life.

These small, inexpensive diamonds, firmly embedded in the hardest metal made by man, can save you up to 40% in dressing costs!

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by **CARBOLOY®**

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On tapping and reaming jobs, if the work is out of alignment with the spindle, the number of rejects due to oversize or bell-mouthed holes may cause a loss several times greater than what it would cost to purchase a tool holder that will remedy the situation.

This is why the Ziegler Floating Holder is used so generally on tapping and reaming jobs. By compensating for inaccuracies in spindle alignment of as much as 1/32" radius or 1/16" diameter, it does away with practically all spoilage losses.

Get a Ziegler Holder and see how quickly your trouble with rejects will disappear. You'll find that it will pay for itself many times over in the course of a year.

**W. M. Ziegler Tool Co.**  
1930 Twelfth St.  
Detroit 16, Mich.



**FLOATING HOLDER**  
for Taps and Reamers...

### Made to Fit Any Machine

Furnished with male or female taper, straight, threaded or special shanks to fit any machine used for tapping or reaming.



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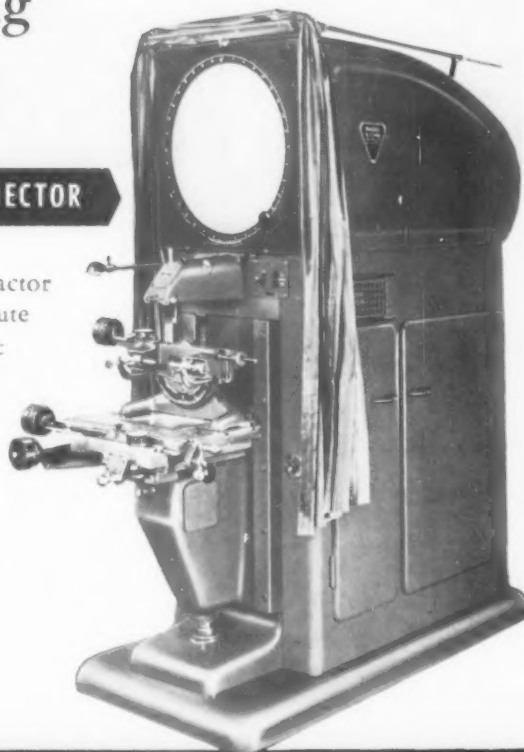
# Save Man-Hours... Save Money...

## In Producing and Inspecting Tools and Finished Parts

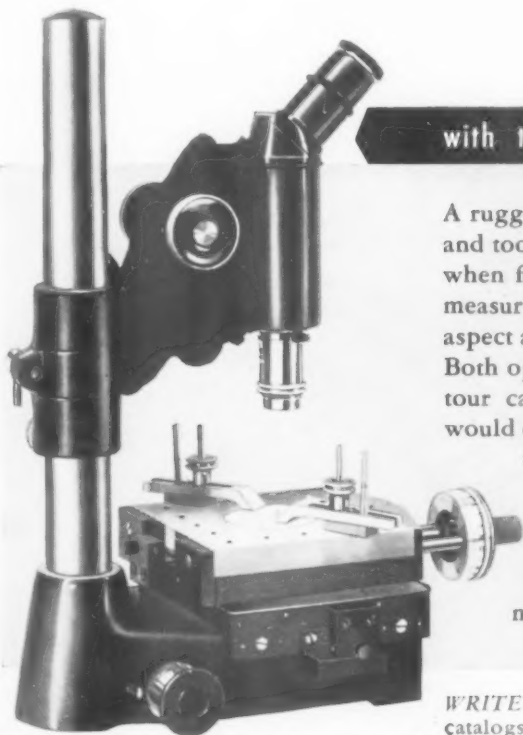
### with the Bausch & Lomb CONTOUR MEASURING PROJECTOR

No other projector gives you this accuracy. With the protractor screen, all angular measurements can be read to  $\pm 1$  minute of arc ( $1'$ ). Direct linear measurements, reading to  $\pm .0001"$ , can be made by means of the cross slide stage. The projected, magnified image of the object on the ground glass screen is sharp, and well defined.

Dimensions, angles, and profiles of production-run parts can be compared directly with a traced outline of the projected image of the master part, or with a large scale drawing superimposed on the screen. Inaccuracies are located quickly and simply. Catalog D-27.



### with the Bausch & Lomb TOOLMAKERS' MICROSCOPE



A rugged shop instrument especially designed for the machinist and toolmaker. It is used for precision linear measurements and, when fitted with the protractor eyepiece, for precision angular measurements. Objects and movements are seen in their natural aspect and direction... not reversed as in ordinary microscopes. Both opaque and transparent objects of regular or irregular contour can be measured. It is ideal for measuring parts which would distort under pressure of the most delicate instruments.

Operation is exceptionally simple and fast. Linear measurements to  $\pm .0001"$  can be made by means of the cross slide stage, controlled by two micrometer screws, and angular measurements to  $\pm 1$  minute of arc ( $1'$ ). Various other attachments are available to meet special measurement problems. Catalog D-22.

WRITE FOR COMPLETE INFORMATION... The above listed catalogs illustrate and describe these and other Bausch & Lomb optical instruments for saving man-hours, and maintaining accuracy standards in metal working industries. Bausch & Lomb Optical Co., 763-Y St. Paul St., Rochester 2, N. Y.

## BAUSCH & LOMB

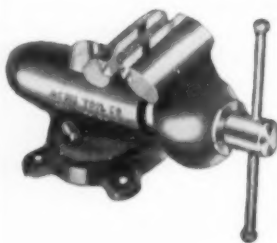
OPTICAL COMPANY



ROCHESTER 2, N. Y.

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Maximum Gripping Power

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No Side Twist or Wobbling

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Jaws

Swivel Bases

11 Sizes from 2" to 6"

Also ACME COMBINATION PIPE AND BENCH VISES  
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INSPECTION TOOLS made of MEEHANITE METAL are  
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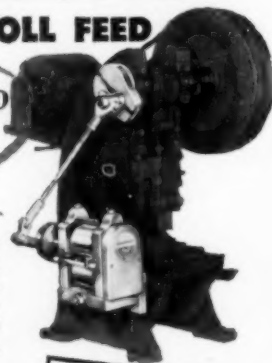
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SURFACE PLATES  
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## No more hand feeding

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**BENCHMASTER**  
FRICTION ROLL FEED

Lowest priced  
AUTOMATIC ROLL FEED  
on the market!



Benchmaster takes the manual labor out of punch press work with this new FRICTION ROLL FEED... and at an astoundingly low price. Costs only ½ to ⅓ of comparable units, fits any Benchmaster and is adaptable to most other presses. Mounts for either front or side feed and is instantly adjustable for correct die height. Handles all common strip and roll materials—metal, wood, plastics, cardboard, felt, etc. Saves time, assures uniform feed, provides greater operator safety.

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Hardened and ground rollers measuring 2¼" diam. Handles stock up to 3" wide x 3/16" max. thickness. Feed rate adjustable 0" to 3" per cycle. Quick reverse for either right or left feed. Height adjustment 0-2¼". Bronze bushed at wear points.

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*Accurately*



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Special cutting tools of all types are a specialty at Detroit Reamer & Tool Company. All carbide-tipped tools are supplied with high speed steel bodies.

Included in our modern equipment are Circularity-Grinding Attachments. Circularity relief can be ground on any special tool, when specified, at no additional cost.

Our engineering department is at your disposal to help solve cutting tool problems.



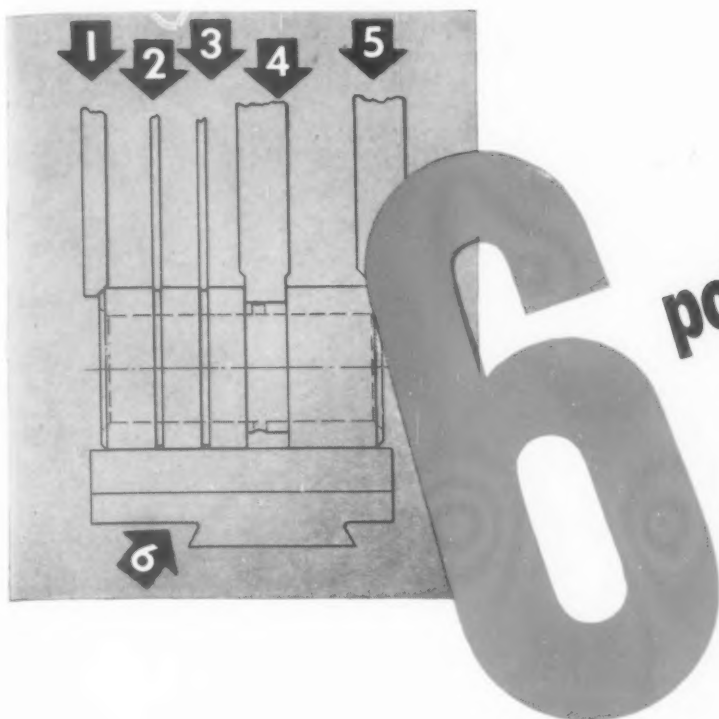
**DETROIT REAMER & TOOL CO.**

Mfrs. of Special High Speed Cutting Tools

2830 East 7 Mile Rd.

Detroit 12, Michigan





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## Tantung tools produced, in 6¾ hours, the work formerly requiring 13½ hours with high speed steel tools

Actual performance figures obtained in shops all over the country repeatedly prove Tantung superiority over high speed steel tools on jobs requiring increased production and tool life.

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For more pieces per grind at speeds and feeds

above high speed steels and just below those of carbides your choice should be TANTUNG.

It's that extra speed and feed on your present equipment that means more profitable metal removing operations for you...and that extra speed and feed is obtained easily with TANTUNG.

Here's a multiple tool operation that enabled a mass production manufacturer to double his production at no extra cost.

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<b>MACHINE:</b>	Coneomatic, 8 spindle.
<b>PART:</b>	Overdrive Stationary Gear.
<b>MATERIAL:</b>	S. A. E. 4042 (cold drawn).
<b>OPERATION:</b>	Grooving, chamfering, facing, turning and cut-off operations to close tolerances and fine finish.

### Comparative Test Data

	TANTUNG	H.S.S.
Rev. Per. Min.	305	230
S.F.M.	135	105
Cycle Time	24.5 sec.	57.0 sec.
Pieces per grind	1000	425
Feed: Front slide	.0014	.0006
Back slide	.003	.0015

For that extra added performance that means a greater margin of profitable operation with TANTUNG call your nearest V-R branch office TODAY! If you want increased production over high speed steel tools and are unable to use carbides because of equipment limitations TANTUNG is your answer.

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An affiliate of The Fensteel Metallurgical Corporation  
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# Make **YOUR** Cams *this Modern Money-Saving way*

## Investigate FCC Cast to Shape Air Hardening Steel Cams for These Machines:

Bookbinding, Boot and Shoe, Bottling, Box Making, Breaking and Crushing, Brick and Tile, Can Making, Candy, Canning, Carpet Weaving, Cigarette and Cigar, Creamery and Dairy, Dredging and Excavating, Electrical, Envelope, Farm, Hoisting, Knitting, Laundry, Mining, Packaging, Paper Mill, Printing, Rubber Working, Rug Weaving, Screw, Textile, Vending, Washing, Woodworking, Wrapping.

**I**T WILL pay you to look into this method if you build or operate machines that use cams. Cast to shape from FCC Air Hardening Steel, your cams reach you with only an eighth-inch to be machined off, even from very intricate shapes. Of course this means big savings of time and material.

FCC Air Hardening Steel has great resistance to abrasion and an extremely high compressive strength. It machines readily and is easy to harden in air with unusual freedom from distortion and cracking. Cams made from it give remarkably long wear.

Full information on this money-saving product is available in a new

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The Tool Engineer

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UNIVERSAL TOOLS THAT WILL INCREASE PRODUCTION AND EFFICIENCY IN YOUR PLANT



Index Plunger



Boring Chuck



Standard Collet Chuck



Mikro-lok Boring Bar



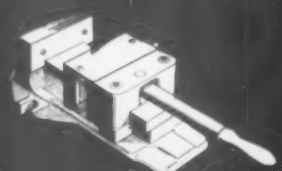
Floating Chuck



Standard Drill Bushing



Grippit



Wedge-Lock Production Vise

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M & M builds  
ALL 3:  
CIRCULAR SAW  
SAW BLADE  
BLADE GRINDER

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*Triple-Chip  
Saw Blade* **Makes  
Difficult Jobs  
Easy!**

45" dia. Triple-Chip segmental saw blade and No. 4 M. & M. Circular Sawing Machine cutting 12" x 24" die block in 30 minutes.

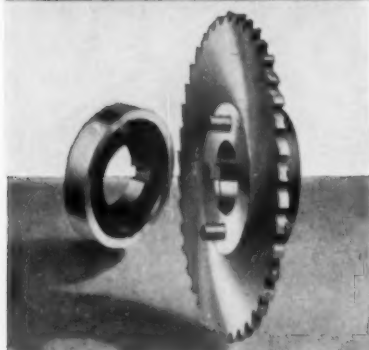


Motch & Merryweather Triple-Chip Blades cut ferrous and non-ferrous metals of any size or shape to accurate lengths—uniformly. Ends are clean, square, burrless. Amazing speeds yield five times as much production as any other practice. Mill-type finish eliminates second operations. Heavier chips and feeds are attained without blade breakage. *Other advantages:* repeated, inexpensive regrinds; maintenance virtually nil; power conserved; longer tool life; big savings in floor space and overhead. M. & M. Triple-Chip Saw Blades from 11" to 70" diameter are segmental with many distinctive features.

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DOUBLE CHIPS

Only the M. & M. Triple-Chip Method gives you exclusive, important advantages.

## Solid Type Blade



Triple-Chip slitting blade (dual drive).

## for Cut-off and Milling Operations

M. & M. solid blades 3" to 18" diameter, of high speed steel, with a range of rake angles and tooth spacings, will meet your exact needs. Triple-Chip features insure high production and unmatched accuracy. M. & M. saw blades have taper ground sides for clearance and a flat hub for mounting. Standard tooth spacings are furnished without extra cost. A standard line of milling saw blades is available. Any arbor size can be accommodated. Standard blades are available for plastics and other non-ferrous materials.

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**THE MOTCH & MERRYWEATHER MACHINERY CO.**  
PENTON BUILDING CLEVELAND 13, OHIO



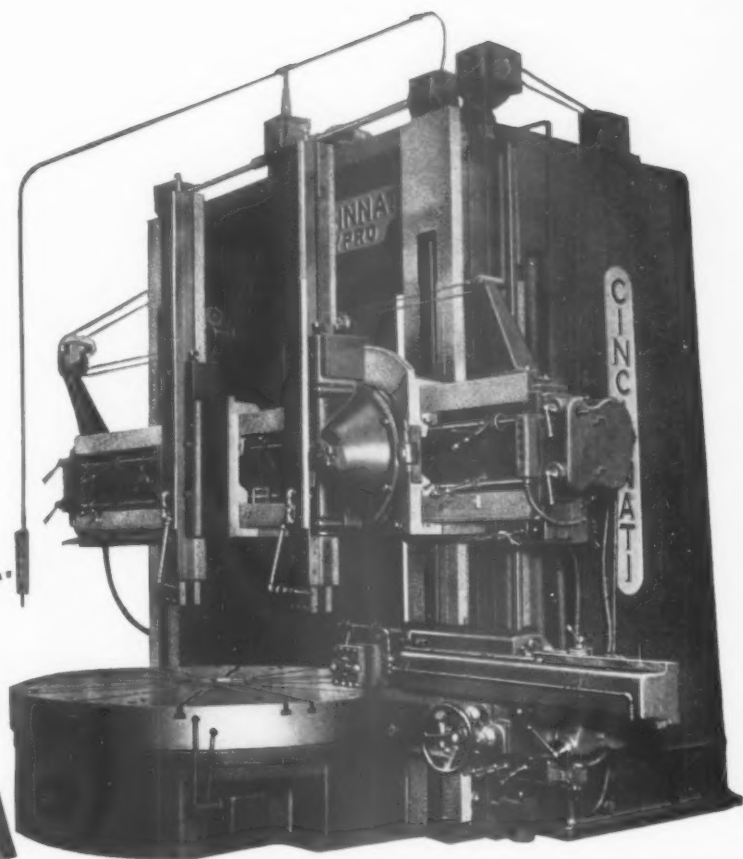
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**FINE INCREMENT SPEED CONTROL—**Multi-point, fine increment motor rheostat controlled from operators position, eliminates compromise speed settings, inevitable with conventional gear changes. Exact cutting speed assures maximum production.

**TAILORED TABLE SPEEDS—**On work of varying diameter table speed may be continuously adjusted for maximum production, without stopping table, without shifting gears and while tools are cutting.

**SET UP TIME REDUCED—**Fine increment table inching control in forward and reverse directions with dynamic braking.

**OPERATOR'S FATIGUE ELIMINATED —**Complete control of all motors from single accessible pendant station, plus absence of table clutch and brake shifting lessens operator's fatigue.



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COMES WITH  
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**HYPRO**  
**SPEED CONTROL**

CAN NOW BE FURNISHED ON ALL HYPRO  
BORING MILLS IN FOLLOWING SIZES:

54"—64"—6'—7'.  
7' widened to 8'. 8'—10'—12'.  
12'—16' Extension type.

**THE CINCINNATI HYPRO PLANER COMPANY**  
PLANERS · BORING MILLS · PLANER TYPE MILLERS  
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Quality gages are lapped to remove grinding marks, as well as the "nap" of a ground surface, imparting a smooth wear-resistant finish.

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AT AN AMAZINGLY LOW COST*

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This reamer, for hand reaming truck camshafts in service work, was produced by Fuller at an exceptional saving over the usual cost of manufacturing conventional types of inserted-blade reamers. Practical analysis of the work it was designed to do—simplification and elimination of many manufacturing operations—made the saving possible.

Just an example of what the Fuller boys are doing day after day for hundreds of customers from coast to coast. The next time you need a special-type tool or reamer—call in Fuller. You, too, will find it pays.

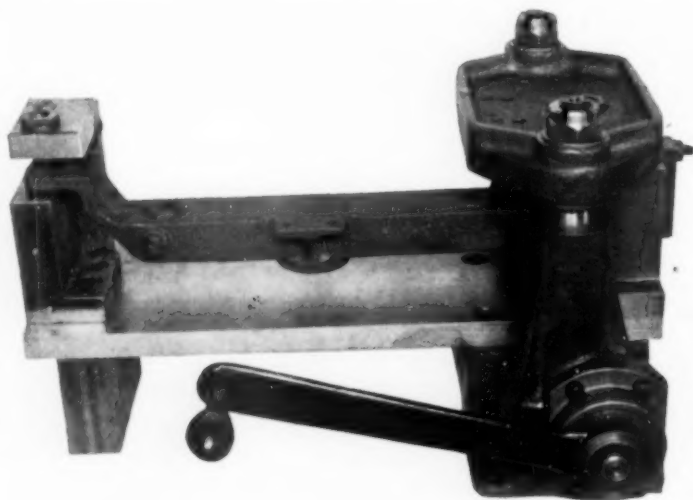
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A Long Manifold is Clamped in a Small Fixture for Drilling End Holes with Accurate Spacing. Standard Fixtures Will Offer Economical Tooling for YOUR Production Parts. Our Engineering Dept. Will Be Glad to Make Suggestions. Send Us Your Part Prints.

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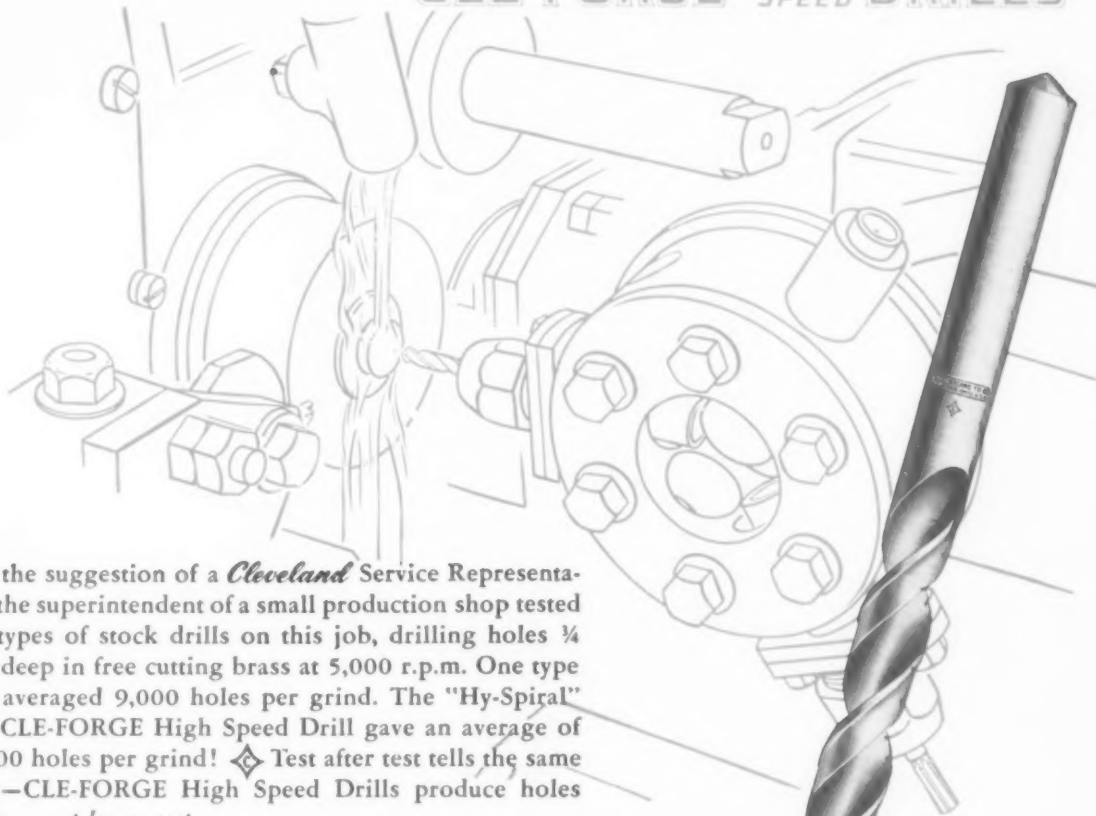
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# 13,000 MORE HOLES PER GRIND with

## CLE-FORGE HIGH SPEED DRILLS



At the suggestion of a *Cleveland* Service Representative, the superintendent of a small production shop tested two types of stock drills on this job, drilling holes  $\frac{1}{4}$  inch deep in free cutting brass at 5,000 r.p.m. One type drill averaged 9,000 holes per grind. The "Hy-Spiral" type CLE-FORGE High Speed Drill gave an average of 22,000 holes per grind! ♦ Test after test tells the same story—CLE-FORGE High Speed Drills produce holes faster . . . at lower cost.

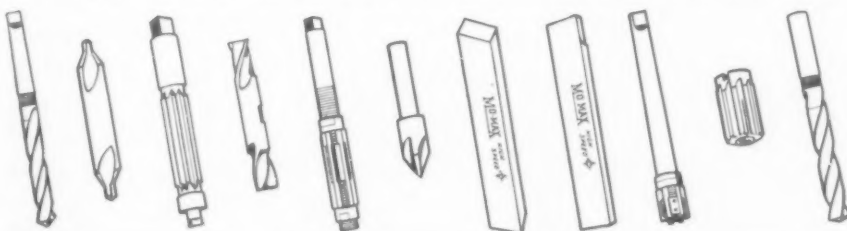
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## Van Keuren THREAD MEASURING WIRES

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Van Keuren measuring wires are the accepted standard equipment for making measurements on thread gages, taps, worms, splines and spur gears. We carry a complete stock of sizes for measuring U. S. Standard, Whitworth, Metric, British Association, Pipe, Acme and 29° Worm threads. Special wires of any diameter in the range from .002" to 1.5708" are made to order. Our large supply of blanks insures prompt delivery. Van Keuren thread measuring wires are manufactured to National Bureau of Standards specifications. They are hardened, ground and lapped by precision methods developed over a quarter-century. They are accurate within .00002" for roundness and straightness and within  $\pm .000025$ " for size. Special sizes are made to any tolerance required.

The New 1948 Catalog and Handbook No. 34 is a 208 page volume, which has been in preparation for nearly two years. It contains complete information and prices on Van Keuren precision gages and instruments as well as valuable new engineering formulas and tables.

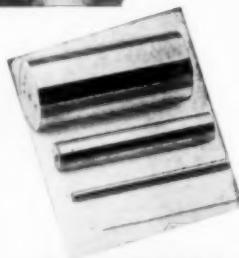
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29th YEAR

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more than  
"SAY-SO"  
to make a  
"BRALE"  
Diamond Indenter



As sole manufacturer of the genuine "ROCKWELL" Hardness Tester and originator of the universally accepted ROCKWELL Hardness scales, Wilson holds a deep responsibility. Every product bearing a Wilson name must have accuracy that approaches perfection. And "BRALE" is a Wilson name.

Remember, an inaccurate hardness test is worse than no test at all as it will pass defective material and reject good material. All the accuracy in your "ROCKWELL" Hardness Tester is lost if inferior penetrators are used. Keep in mind that one point of hardness on the Rockwell Scale represents a depth of only 0.00008".

**WILSON**

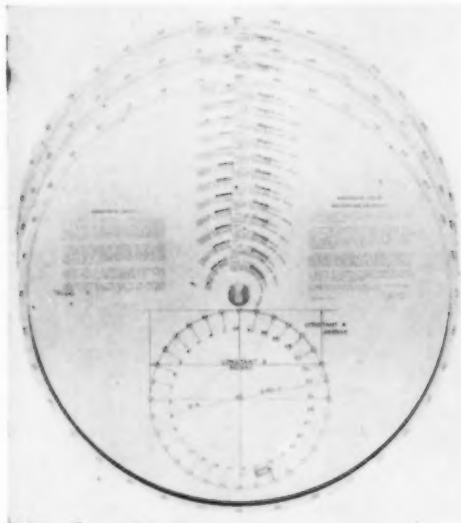
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Four circular plastic charts, of highest quality, oil and grease resistant, in a smart, simulated leather case, with descriptive pamphlet and sample problems solved.

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For Hole Location Use:

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Developed by Walter Woodworth, whose well-known Woodworth Tables have been published by Pratt & Whitney and the Moore Special Tool Company in book form. Fifty years of practical shop experience, from apprentice to tool & diemaker on the bench to shop executive, highly qualifies Mr. Woodworth in the tool-making field. Those charts are real time and money savers, tested by use in the shop (particularly with each jig-borer) and on the design board. Send for your sets today.

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# A Two-Way Cut in Grinding Costs *with*

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GRINDERS

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You'll find it helpful. It contains valuable data on grinding wheels and abrasives. Know the facts about Besly Titan Steelbacks... they save "down time" and boost production.

This 218-20" Besly Grinder is tooled for finish grinding the stem ends of automotive valves from .309" to .434" dia.—in lengths from  $4\frac{7}{16}$ " to  $6\frac{1}{32}$ ". Out-put is 30 valves a minute with a 15-20 micro-inch finish. Ends are ground square with stem within a tolerance of .0003" and, locating from taper seat, are held within .002" for length.

Net results are increased output at a lower labor cost per unit—plus a saving in

capital investment (one grinder handles all valve stem sizes with a single fixture).

This design shows what can be done to step up production on "difficult" operations. It is typical of the kind of production grinding problems that Besly men are called on to solve in the fight to cut costs and improve product quality.

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MACHINES AND TOOLS FOR ALL OPERATIONS  
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**SPEEDS  
ASSEMBLY . .**



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**KNURLED  
SOCKET HEAD CAP SCREW**



The head of the ubiquitous "Unbrako" Socket Head Cap Screw is KNURLED to speed assembly. The KNURLS "gear" right to the fingers—the handiest of wrenches—no matter how oily, and a positive slip-proof grip is the result—no futile motion. Of course, the Internal Wrenching feature provides cost savings in material, weight and space. Sizes from #4 to 1½" diameter, in a full range of lengths.



Kits: pat. pend.

Knurling of Socket  
Screws originated with  
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You can't tighten or loosen socket screws without a hex socket wrench, so why not use our #25 or #50 "Hallowell" Key Kit, whose Hollow Handle contains most all hex-socket bits. Write us for the name and address of your nearest "Unbrako" Industrial Distributor and for your copy of the "Unbrako" Catalog.

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Are you  
Twisting "Bugs"  
into your  
products

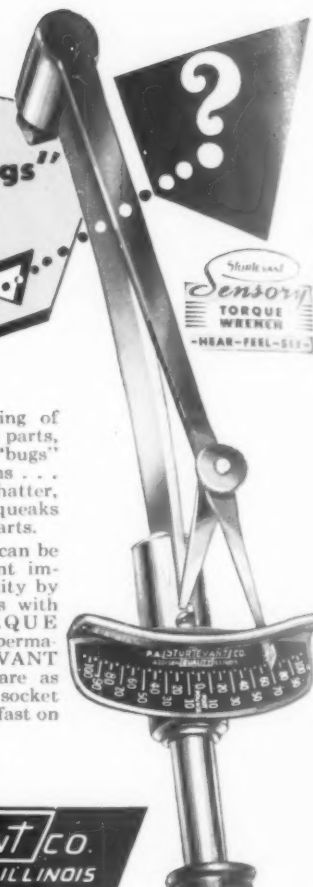
Improper tightening of screws, nuts, and threaded parts, accounts for many of the "bugs" that develop in mechanisms . . . causes binding, breakage, chatter, thread stripping, leakage, squeaks and loosening and loss of parts.

These mechanical faults can be eliminated with a resultant improvement in product quality by torquing all critical points with STURTEVANT TORQUE Wrenches. Inherently and permanently accurate, STURTEVANT TORQUE WRENCHES are as easy to use as an ordinary socket wrench, and are extremely fast on the production line.

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SW41

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GRINDERS:

JUNIOR  
MODEL  
75,000 RPM

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MODEL SS-SR  
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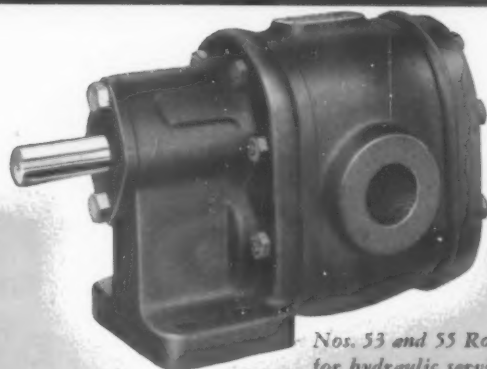
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A powerful, fast-cutting tool, streamlined in design, easy to handle. Designed for real production work and the toughest jobs. Precision made, excellent balance. Special grease-sealed bearings . . . no lubrication required. Fitted with steel housing, a special safety feature.

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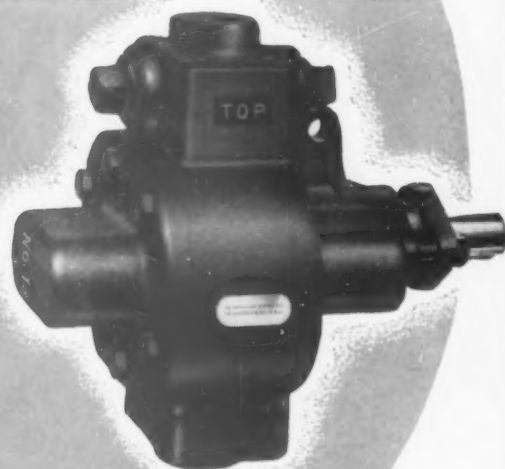


*Nos. 53 and 55 Rotary Geared Pumps  
for hydraulic service—pressure up to  
200 lbs. p.s.i.*

# Pumps that back up your design



*Rotary Geared Pumps  
for general purposes*



*Rotary Geared Pumps  
Reversible Type  
for general purposes*



*500 Series Rotary Geared Pumps  
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**Y**OU'VE MADE SURE of everything about your machine design...including lubrication, coolant supply and hydraulic service. Now make sure that the pumps you specify back up your design—specify Brown & Sharpe Pumps.

Everything about these pumps... design, materials and manufacturing... is the result of long experience in fulfilling the pump requirements for machine tools and other machine equipment. The

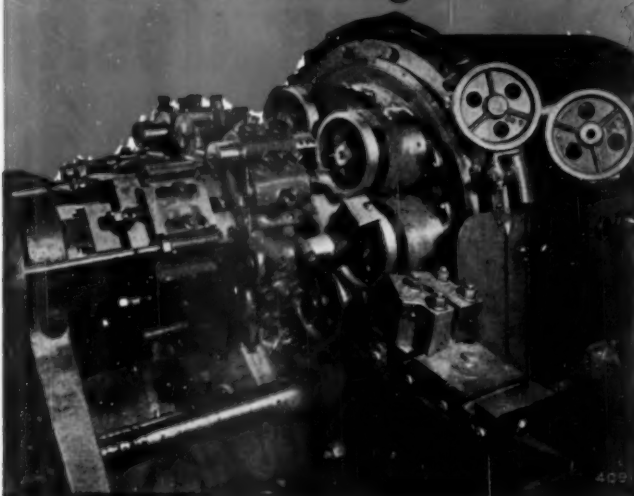
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*We urge buying through the Distributor*

**BROWN & SHARPE PUMPS** 

**fact:** gear blanks  
are turned with accuracy  
and speed on **Baird**  
**Automatic Chucking Machines!**

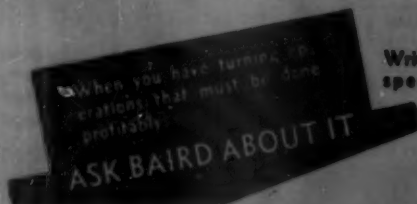


You need a Baird Automatic Chucking Machine in your shop if you have turning operations that must be done profitably. That's been a fact since the turn of the century!

You need a Baird because it is the one machine that you can depend upon, friend of the tool engineer and shop superintendent alike because of its speed and accuracy.

The machine illustrated above shows why! Here facing, turning and boring gear blanks is combined in one operation. The tolerances were close, the stock was hard but Baird maintained accuracy and set new production per hour records.

Here the special Baird feature of selection of spindle speed for each position proved its value: high spindle speeds were selected in the finishing positions so that carbide tools could be used to produce the fine accurate surfaces demanded.

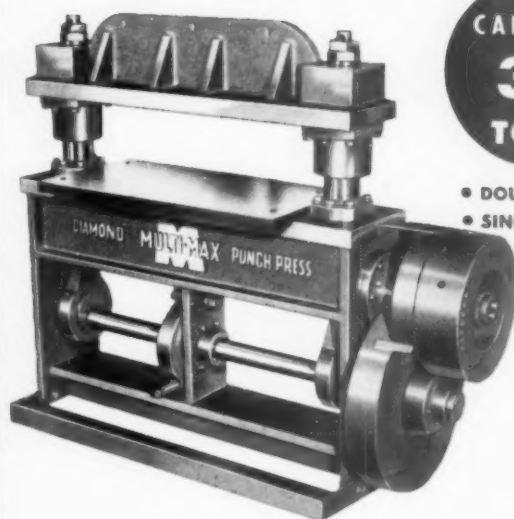


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**THE BAIRD MACHINE  
COMPANY, STRATFORD, CONN.**

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## Multi-Max Punch Press



CAPACITY

**30  
TONS**

- DOUBLE CRANK
- SINGLE GEARED

EXCEPTIONALLY LARGE BED & RAM AREAS



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— and correct  
**UNBALANCE**  
without removing work from Machine!

The Micro-Poise Balancing Machine quickly — and accurately — measures and corrects unbalance in rotating parts. The location and amount of unbalance is read directly on calibrated scales within six seconds after release of operating lever. The Micro-Poise Balancing Machine is sturdy; built to withstand strain and shock during loading; has no revolving parts; requires no power for checking.

### DRILLING UNIT

Work can be brought into balance by drilling out excess material by means of vertical (illustrated) or horizontal drilling unit attachable as integral part of machine. With unit attached, unbalance is located, measured and corrected by drilling to the indicated depth. Full details in Bulletin mailed on request. Other sizes and models.



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Sizes  $\frac{3}{8}$ " and  $\frac{1}{2}$ ".

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**NO DANGER OF PRESSURE BUILD-UP.** Thanks to the automatic safety relief feature of Hannifin's "Air Warden" valve design. No pressure build-up above setting of regulator even if valve is accidentally prevented from seating tight.

**SAVES AIR.** Easy to "back off" pressure without exhausting control valve. No air lost except excess pressure.

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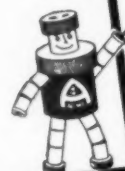
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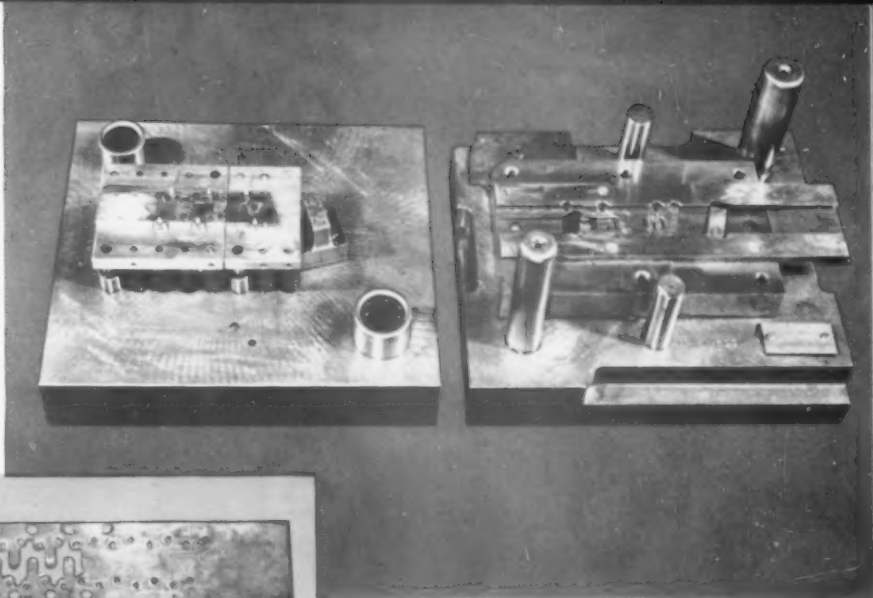
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per hour  
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Precision Die Set



## two post set maintains accurate punch and die relationship

This 9-station progressive die setup produces two small offset brackets at a time from AISI-1008 steel strip stock  $1\frac{9}{16}'' \times .071''$  at a press speed of 90 strokes per minute. The press delivers a gross production of 10,800 pieces per hour. A Danly all-steel two-post precision die set maintains tolerances of  $+.002''$  on the depth of the offset. Depth of embossing is held to  $.005''$ .

save  
time

USE DANLY NATION-WIDE  
DIE SET ASSEMBLY SERVICE

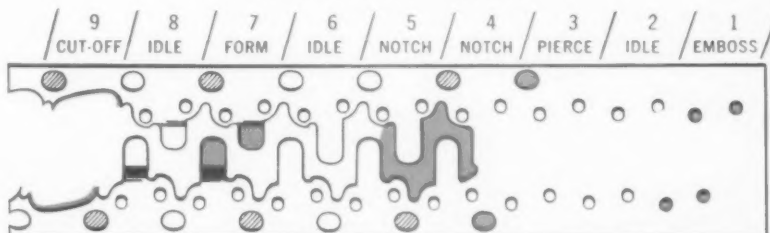
Use Danly's specialized service to save time and money. Assembly plants listed below (marked with stars) stock interchangeable parts for quick assembly and delivery of any standard die set to suit your specifications.

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- ★ Cleveland 14, 1550 E. 33rd St.
- ★ Dayton 2, 990 E. Monument Ave.
- ★ Detroit 16, 1549 Temple Ave.
- ★ Grand Rapids, 113 Michigan St., N.W.
- ★ Long Island City 1, 47-28 37th St.
- ★ Los Angeles 54, Ducommun Metals & Supply Co., 4890 S. Alameda
- ★ Milwaukee 2, 111 E. Wisconsin Ave.
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## 250,000 pieces per die grind

On a total production of 750,000 pieces, an average of 125,000 strokes or 250,000 parts has been obtained per die grind. The precision built into Danly Die Sets (leader pins and bushings are held to limits of .0002 of an inch) helps you obtain a longer die life and lower stamping costs. Get top performance—specify Danly Precision Die Sets for every job. They're available for any type of press operation.

### OPERATION CHART



Note: Shaded holes show pilot positions.

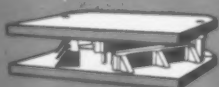
Write for this *free* bulletin

Illustrates how Danly's machining and welding service for special die sets will help you save additional time and money.



**DANLY**

**DANLY MACHINE SPECIALTIES, INC.**  
2200 SOUTH 52ND AVENUE, CHICAGO 50, ILLINOIS



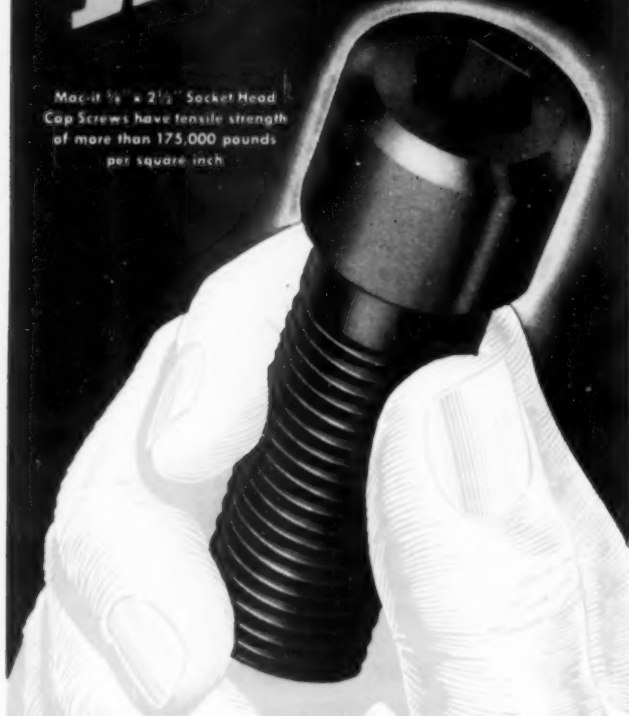
25 YEARS OF DEPENDABLE SERVICE  
TO THE STAMPING INDUSTRY

PRECISION DIE SETS...STANDARD AND SPECIAL • MECHANICAL PRESSES AND PRESS EQUIPMENT



# IT'S A **Mac-it** PRONOUNCED "MACK-IT"

Mac-it  $\frac{1}{4}$ " x  $2\frac{1}{2}$ " Socket Head  
Cap Screws have tensile strength  
of more than 175,000 pounds  
per square inch



## BETTER, FASTER SERVICE WITH THIS COMPLETE MAC-IT LINE!

Because many standard types of Mac-its are stocked throughout the country for quick delivery, and because specials can be engineered to your own specifications, you'll find it pays to investigate Mac-its first.

Mac-it's 35 years' experience in the manufacture of heat-treated, alloy steel screws is your assurance of precision, uniformity and strength. Sold through leading industrial distributors from coast to coast and in Canada. Write for new catalog today!

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**STRONG, CARLISLE & HAMMOND COMPANY**  
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## SCHERR aids to precision



### Will not shift while measuring— CHESTERMAN HEIGHT GAGE

A big, sturdy stabilized instrument. Fine adjustment by screw operated from knurled nut on base (see photo) eliminates movement of instrument while measuring. Finger pressure on two lugs frees split nut for rapid vertical adjustment of head.  $2\frac{1}{2}$ " long vernier in place of the normal  $\frac{1}{2}$ " vernier provides greater visibility without need of magnifier or removing gage from work. English and metric readings one on each face of column.

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An instrument priced for any shop's budget, that will save its cost many times by preventing rejects. Spot-checking with the Wilder at the start and during a production run, instantly reveals any tendency to go beyond tolerance due to wear of tools or other cause. This is a bench type tool, with an almost vertical screen, on which the magnified image is thrown, and a conveniently placed work stage. Designed and built for continuous quantity inspection. Priced unusually low. Write. Also in Model A for general use.



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## INSPECTION *discs*

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### *Complete information on this newest Latrobe service...*

Now Latrobe Electric Steel offers another far-reaching service... hardened, polished and etched Inspection Discs cut from bars in your own mill order for DESEGATIZED BRAND Steels.

What this new Latrobe service means to you as a user of tool or die steels is fully described in a timely new bulletin, which...

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It's a booklet you can't afford to be without... mail the coupon below.

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### DESEGATIZED

BRAND OF DISPERSED-SEGREGATE

HIGH SPEED STEELS  
TOOL & DIE STEELS

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## Latrobe

ELECTRIC STEEL COMPANY • Latrobe, Pa.

LATROBE ELECTRIC STEEL COMPANY, LATROBE, PA.

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**INCREASE  
YOUR  
CUTTING  
BETTER THAN  
30%**

*with* **MILFORD  
WAVY SET  
BAND SAW BLADES**

**YOUR OWN  
MACHINES  
ARE YOUR  
BEST PROVING  
GROUND**

**TEST A  
MILFORD  
WAVY SET  
BLADE  
against the  
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Now individually  
packed in cartons  
for ease in handling

Yes . . . it's true . . . enthusiastic users tell us that 30% increased production on horizontal and vertical cut-off band saw machines is conservative.

These blades of unique design eliminate ripping of teeth . . . and cut with greater precision and closer tolerance. One pitch, 10-tooth blades can be used for cutting bar stock, angles and pipe.

Available in the  $\frac{3}{4}$ " 10 and 12-tooth sizes for immediate shipment.

Your Industrial Supply Distributors are always ready to serve your needs for all factory and mill supplies as well as MILFORD WAVY-SET and other blades. Order through them.

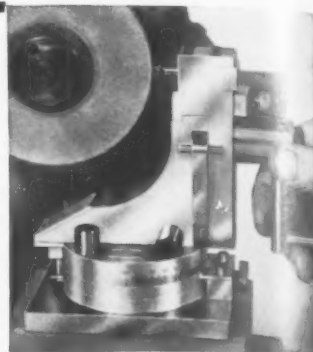
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BAND SAW BLADES  
RESISTOR AND DUPLEX  
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THE HENRY G. THOMPSON & SON CO.

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IS  
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Quick set-up and operation, with remarkable accuracy, make Fluidmotion Radii and Angle Dressers the finest precision instruments of their type obtainable. Two angles and a radius can be dressed in one continuous motion, after only one setting. Angles and radii flow into each other, without sharp change of direction.



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J and S Form Grinding Service: Counterbores, Circular Form Tools, Hollow Mills, Gun Drills, Flat Drills, End Cutters, Boring Tools, Step Drills, Watch Drills, etc.

*Ever use a really  
free cutting reamer?*

**TRY WAUKESHA'S  
SHELL OR SHANK TYPE  
with "CUSHION - LOCKED"  
ADJUSTABLE BLADES**



For standard and heavy-duty work  
Sizes up to 6 $\frac{1}{2}$ " in stock  
Larger sizes on application

**WAUKESHA  
Tool Corporation**

1424 Arcadian Avenue

WAUKESHA, WISCONSIN



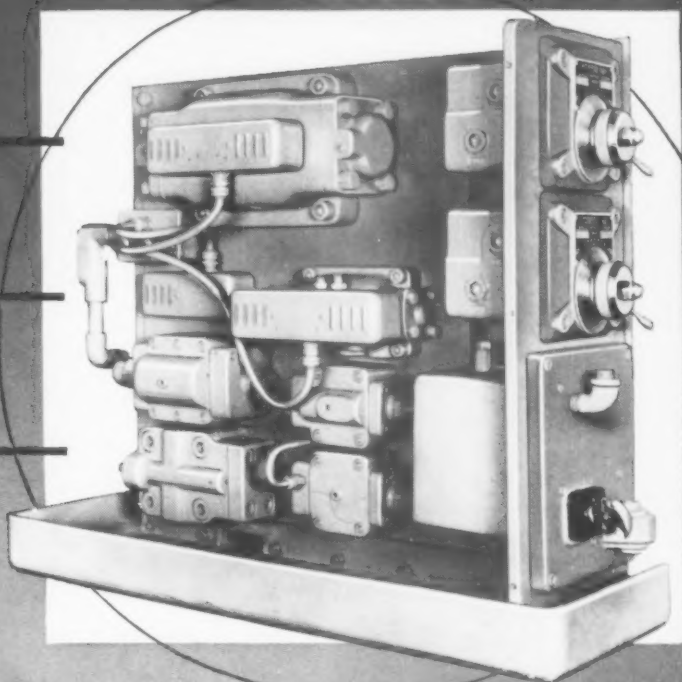
# VICKERS Hydraulic CONTROL VALVES

## Gasket Mounted

**Simplify Installation**

**Save Space**

**Make Adjustment Easier**

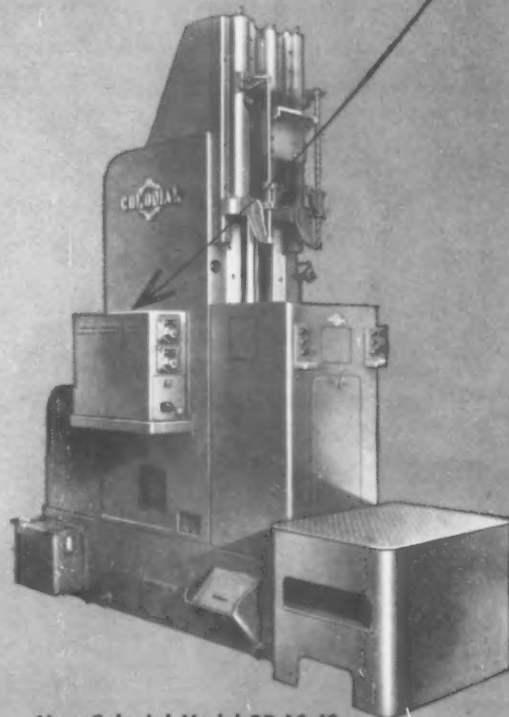


This new Colonial Pull-Down Broaching Machine is an excellent example of how Vickers Gasket Mounted Valves simplify installation, save space and make adjustment easier for hydraulic control systems.

All valves in the panel box are easily accessible for adjustment by simply removing the cover. For cleaning and other maintenance, any valve can be completely removed by just loosening the hold-down screws . . . the piping is not disturbed and the system is not drained. The installation is simplified and more compact because all hydraulic piping connections are made into the opposite side of the machined surface upon which the valves are mounted with sealing ring type gaskets. The concealed piping also results in improved appearance.

Contact the Vickers Application Engineering Office nearest you for suggestions on how Vickers Hydraulic Equipment can improve your machinery.

All hydraulic control units for the machine are included in this group. Flow control valve adjustments convenient to operator without opening panel box.



### WRITE FOR NEW BULLETIN, 48-27

This bulletin will give you useful information regarding applications, advantages and installation drawings for Vickers Gasket Mounted Solenoid Controlled Directional Valves.

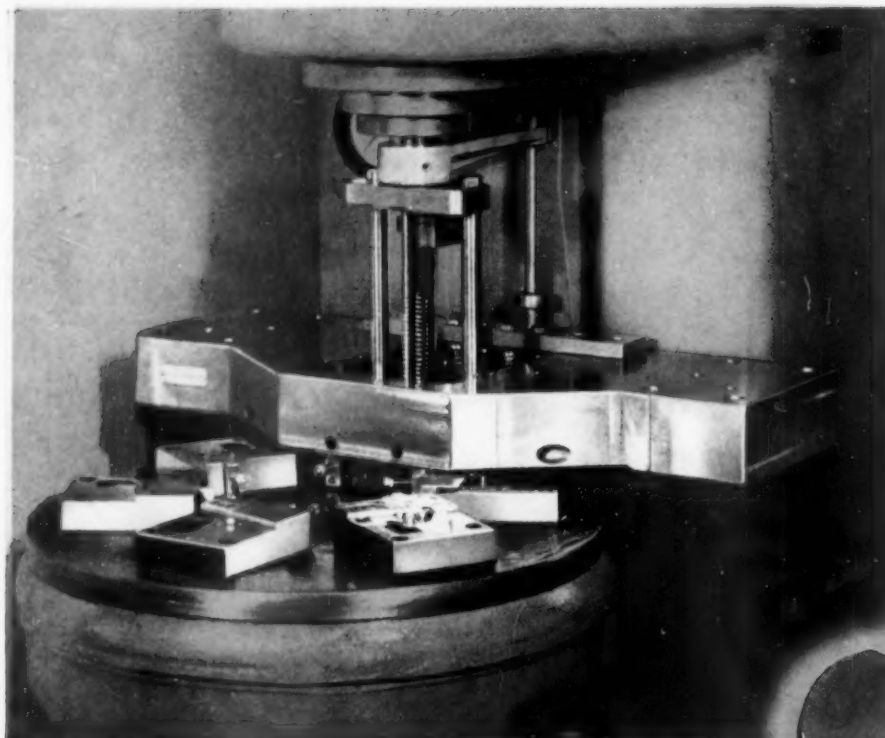
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DIVISION OF THE SPERRY CORPORATION

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Application Engineering Offices: ATLANTA • CHICAGO • CINCINNATI • CLEVELAND • DETROIT  
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New Colonial Model RD-10-42  
Pull-Down Broaching Machine  
has Vickers Hydraulic Controls.



**780**  
**PARTS**  
**PER HOUR**



**PART**  
Actual Size

# Broaching STAMPINGS

**INCREASES PRODUCTION AND IMPROVES FINISH**

## TOOLING:

The illustration at the top shows the tooling which Detroit Broach designed and built to broach the slot in this stamping. The operator loads the stamping at the front of the fixture. As the part is indexed around to broaching position, it is automatically clamped. Because the part is open and thin, the broach is returned through the part to starting position after broaching. The fixture then indexes again and the part is automatically ejected.

## MACHINE:

Push Type Hydraulic Press

## STOCK REMOVED:

$\frac{1}{32}$ " Per Side

## MATERIAL:

C.R.S. Stamping

## ALTERNATE METHOD:

Hobbing

With one broach and a completely automatic six-station indexing fixture, designed and built by Detroit Broach, these stampings are finished at a rate of 780 per hour. This production output is many times greater than is possible by other methods, and the finish of the broached surface is suitable for final assembly.

This performance record is typical of the production economies of Detroit Broach tooling. Because our engineers specialize in broach tooling only, they are familiar with all types and makes of machines suitable for broaching—as in this case where, to reduce tooling costs, a hydraulic press was selected. Through this knowledge they are able to recommend from all aspects the type of equipment best suited for any broaching operation.

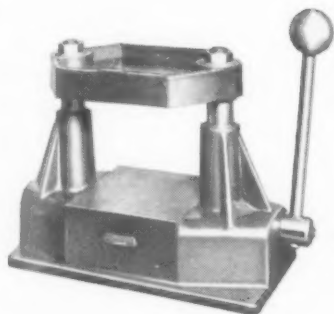
Detroit Broach application engineers are at your disposal to discuss broaching problems. They will gladly supply you with actual cost and production data for your jobs. Write today for our representative to call.

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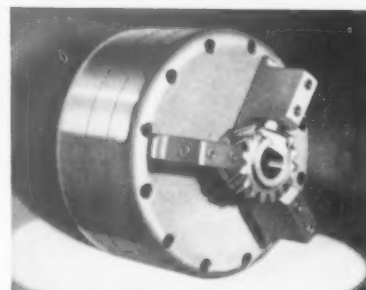
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**CONE-LOK JIGS**

Chucks engineered and built by Woodworth guarantees the ultimate in precision gear chucking.

Woodworth Cone-Lok Jigs are noted for their mechanical simplicity and "life-time" construction.



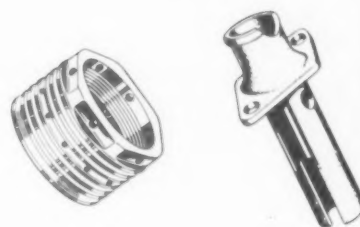
**DIAPHRAGM CHUCKS**



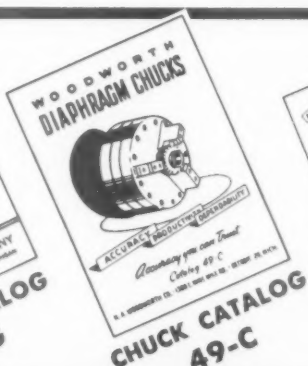
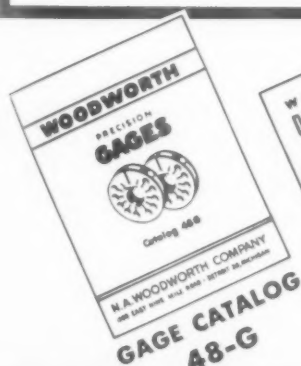
**PRECISION GAGES**

Woodworth manufactures a complete line of thread ring and thread plug as well as cylindrical plug and ring gages. Also produces special gages to customer blueprints.

N. A. Woodworth engineering gives you plus value in precision parts: Production men with "know-how" combined with well equipped plant are pace setters in aircraft engine and radar assembly fields.



**PRECISION PARTS**



### WRITE FOR LITERATURE

New, comprehensive catalogs on N. A. Woodworth chucks, jigs and gages. Precision parts data supplied upon request for specific information. All inquiries should be on your company letterhead and mailed to address below.

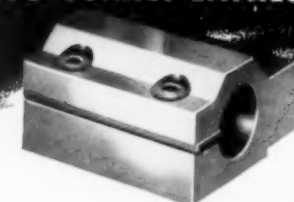
# WOODWORTH

N. A. WOODWORTH CO., 1300 EAST NINE MILE ROAD • DETROIT 20, MICHIGAN  
PRECISION GAGES • DIAPHRAGM CHUCKS • CONE-LOC JIGS • PRECISION PARTS



## Now YOU CAN ADAPT *All* BOKUM BORING TOOLS TO TURRET LATHES

The same notable economies that users of Bokum Long-life, Precision Boring Tools have been enjoying for over a decade on lathes and boring mills are now extended to operators of turret lathes—through our development of Turret Lathe Tool Holders, shanks and adaptors.



Holder BT-24 (top) has  $1\frac{1}{2}$ " bore. Accommodates split bushings (A) to hold  $1\frac{1}{4}$ " and 1" shanks for Bokum Tools Nos. 4 to 12 to give you boring range  $1\frac{1}{8}$ " to 2" min. dia. You have but one investment in shanks; only cutters need be replaced.

Adaptor B-100-70 (below) fits holder. Has  $\frac{3}{8}$ " bore to hold Bokum Tools Nos. 00000 to 3, giving you theoretical boring range  $\frac{1}{8}$ " to  $\frac{3}{8}$ " min. dia.



Ask for folder T-1048 giving complete information.

This combination increases efficiencies in boring operations. It brings you advantage of using entire range of Bokum Tools on turret lathes.



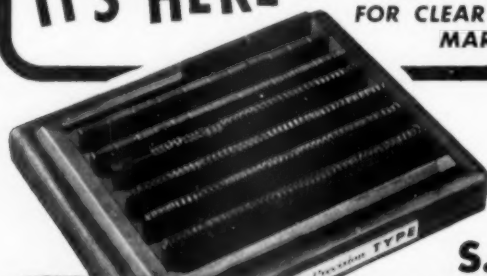
**BOKUM TOOL CO.**

14775 WILDEMERE AVE. • DETROIT 21, MICH.

SINGLE POINT BORING TOOLS—INTERNAL THREADING, BOTTOMING AND FACING TOOLS—CARBIDE TIPPED TOOLS

## IT'S HERE!

...THE NEW  
"SAFETY" TYPE  
FOR CLEAR-CUT  
MARKING



Note neat, attractive stamping on metal ash tray. Also excellent for name plates, advertising novelties, etc.

**S. T. M.  
PRECISION TYPE**

Now . . . your products can be marked clearly, legibly and attractively with this new precision type. Extra deep engraving in sizes from  $1/32$ " to  $1/2$ " gives beautiful stamping in brass, aluminum, copper, steel, leather or hard rubber. Reverse characters for stamping molds. Made for any holder, press or marking machine.

Write for Complete Data



**CUNNINGHAM CO.**  
SAFETY STEEL STAMPS

169 East Carson Street • Pittsburgh 19, Pa.

## THREAD AND FORM ROLLING TOOLS and MACHINES EXCLUSIVELY!

REED Cam-Actuated, Triple Die  
THREAD ROLLING MACHINES

REED Cylindrical and Flat  
THREAD ROLLING DIES

REED KNURLS

REED THREAD ROLLS

A Complete  
THREAD ROLLING  
SERVICE



REED THREAD ROLLS  
made to specifications

Threads may be rolled on certain classes of work economically with thread rolls on screw machines. The thread rolls are mounted in special holders on the cross slide in a similar manner to knurls.

Send for General Bulletin S-1

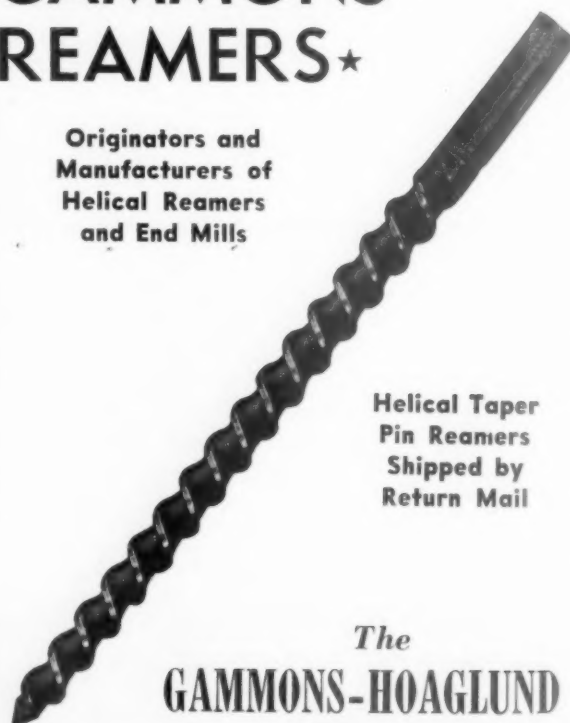
**REED ROLLED THREAD DIE CO.**

Manufacturers of  
THREAD ROLLING MACHINES AND DIES—  
KNURLS—THREAD ROLLS.  
WORCESTER 2, MASS., U.S.A.



## GAMMONS REAMERS★

Originators and  
Manufacturers of  
Helical Reamers  
and End Mills



Helical Taper  
Pin Reamers  
Shipped by  
Return Mail

The  
**GAMMONS-HOAGLUND**  
Company

400 Main Street, Manchester, Conn.

# OVER 20,000 and Still Going Strong

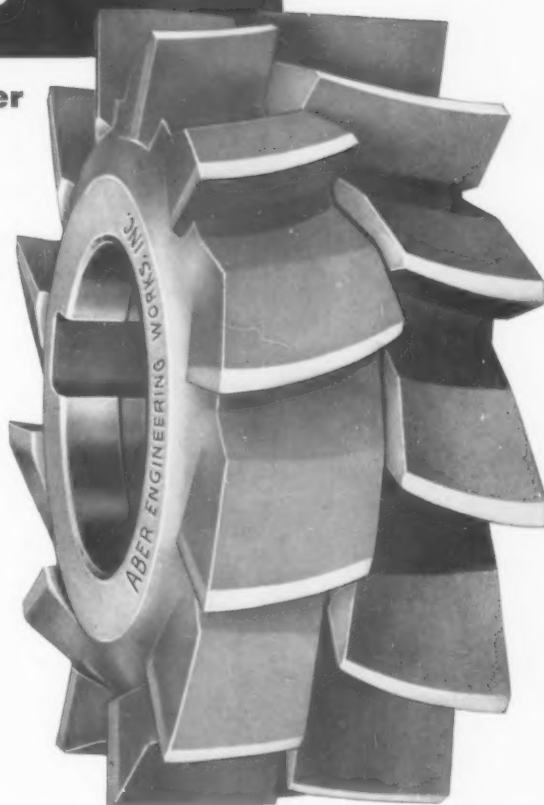
...With An Aber Curved Tooth Milling Cutter

Objectional chatter marks from standard type cutters surprisingly resulted in increasing production from 4,000 to 20,000 pieces per grind

Eight months ago a manufacturer experienced difficulty in obtaining a smooth surface on a side milling operation while using standard type cutters.

Aber "Curved Tooth" right and left hand shear side milling cutters were recommended to eliminate chatter marks. NO THOUGHT WAS GIVEN TO INCREASING PRODUCTION.

The results proved outstanding — After eight months of continuous operation, without once removing the cutters from the machine, Aber "Curved Tooth" cutters produced 20,000 pieces against previous peak outputs ranging between 3,000 and 4,000. In addition the cutters are still producing pieces within specified tolerances and with a finish finer than that obtainable with NEW standard type cutters.



## Here Are the Facts

### OPERATION DATA

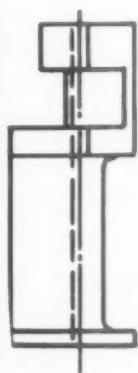
MACHINE: U. S. Multimiller

TOOL: Aber "Curved Tooth" right and left hand shear side milling cutter. 3" x 3/8" x 1 1/4"

MATERIAL: Bronze Turbine Blades.

### COMPARATIVE PERFORMANCE

	ABER CUTTER	STANDARD CUTTERS
S. F. M. Speed:	400sfm	400sfm
Feed per Rev.:	16" per min.	12" per min.
Depth of Cut:	1/8"	1/8"
Pieces per Grind:	20,000 and still going strong	3,000 to 4,000 maximum



You too can profit by applying Aber "Curved Tooth" milling cutters for increased production and reduced rejections due to off-tolerance, unsatisfactory finish milling operations. Remember every Aber Tool has the exclusive, patented "Curved Tooth" design providing chatterless, smooth cutting action.

**ABER**  
ENGINEERING WORKS INC.  
WATERFORD, WISCONSIN



## December, 1948

## IN CHICAGO ATTRACTIVE STORES TO RENT

**Frankenstein & Company, Agents**  
110 South Dearborn Street  
CEntral 6-5753

**American Society of Tool Engineers**  
**10700 Puritan Ave., Detroit 21, Michigan**



# EX-CELL-O

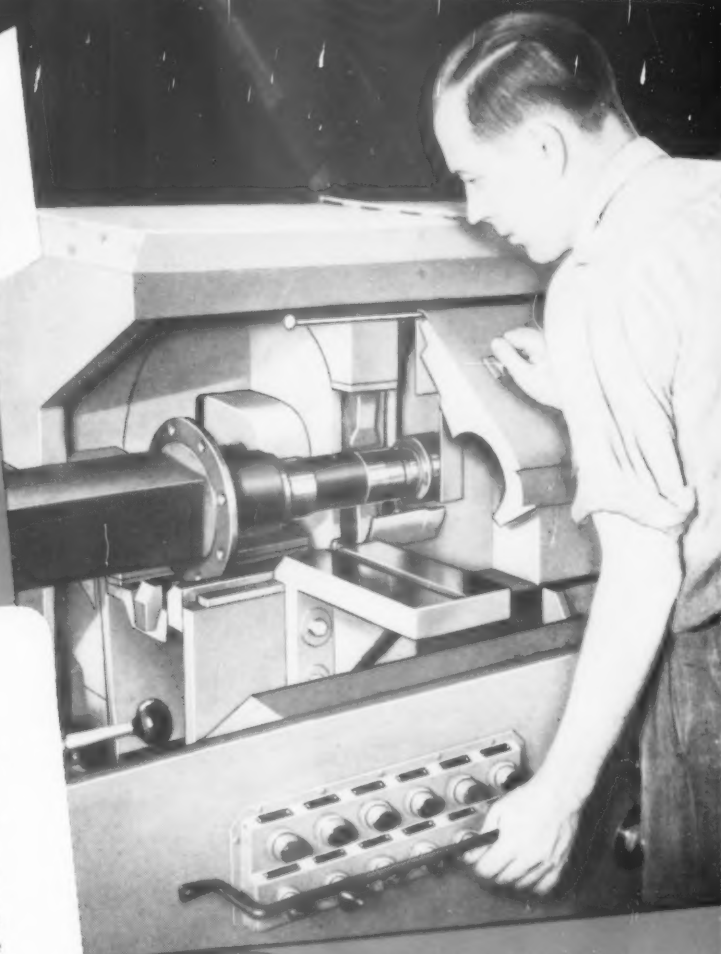
**CAN GIVE YOU  
MORE ECONOMICAL  
PRODUCTION**

*For Instance.*

## **On Applications of Modern Thread Grinding:**

The special Ex-Cell-O machine illustrated here grinds threads on large tough axle housings for some of the heaviest trucks and busses that travel the highways. The housings are made of forged steel hardened to approximately 40-C Rockwell. Special tooling on this production machine includes approximate locators to aid in handling the heavy awkward parts, a hydraulically actuated tailstock which shifts the parts from the locators to the work centers, and an automatic chuck on the work spindle which eliminates the need for a driving dog. The wide multi-rib grinding wheel cuts the threads fast. A combination of electric and hydraulic actuation and controls simplifies operation of the big grinder.

If you have any production work or problems that involve thread grinding, get in touch with your nearest Ex-Cell-O representative or write to Ex-Cell-O Corporation, Detroit.



Above: Ex-Cell-O special thread grinder at work on axle housing.



Center: A close-up view of one end of an axle housing showing the ground thread.

Below: Special Ex-Cell-O Thread Grinder for grinding threads on heavy forged steel axle housings. Note the clean simple lines of the welded steel base and the convenient grouping of operating controls.



# EX-CELL-O CORPORATION

Detroit 32, Michigan

Special Multiple Way-Type Precision Boring Machines • Special Multiple Precision Drilling Machines • Precision Boring, Turning, and Facing Machines and Fixtures  
Precision Cylinder Boring Machines • Precision Thread Grinding Machines • Precision Lapping Machines • Precision Broach Sharpening Machines  
Other Special Purpose Machines • Tool Grinders • Continental Cutting Tools • Broaches and Broach Fixtures • Counterbore Sets • Grinding Spindles  
Hydraulic Power Units • Drill Jig Bushings • R.R. Pins and Bushings • Fuel Injection Equipment • Dairy Equipment • Aircraft and Miscellaneous Production Parts

# HOLO-KROME

## SOCKET HEAD STRIPPER BOLTS

### **ACCURACY** assured

Facts - (1) made from special analysis alloy steel (2) scientifically heat treated to develop the utmost in the necessary physical properties (3) heads, bodies and threaded portion perfectly concentric (4) bodies are ground (5) threads are perfect in lead and held to Class 3 Thread Fit (6) checked and gauged to the Holo-Krome rigid standards of accuracy during each step in production (7) and finally, every single bolt individually hand inspected before packaging . . .

Accuracy is assured in H-K Stripper Bolts and in all Holo-Krome quality Socket Screw Products. For guaranteed unfailing performance specify "Holo-Krome".

H-K Distributors give prompt service from their warehouse stocks. Try 'em!

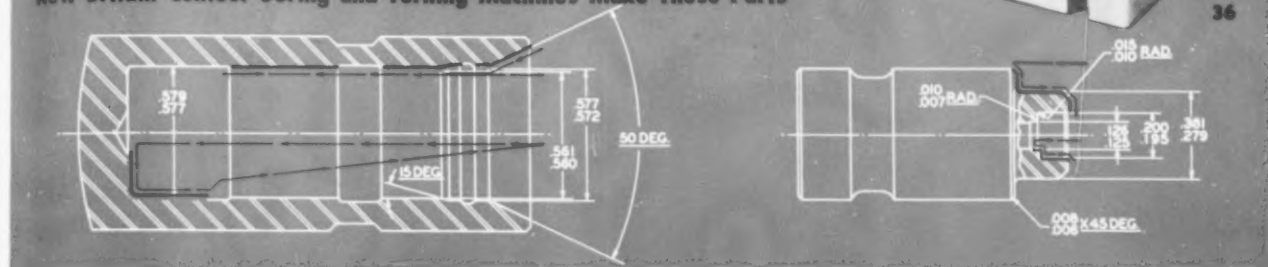


FIBRO FORGED  
SCREWS

THE HOLO-KROME SCREW CORP. HARTFORD 10, CONN.

**Manufacturer**

- 

Model  
36

Plunger - 393 pieces per hour



# NEW BRITAIN

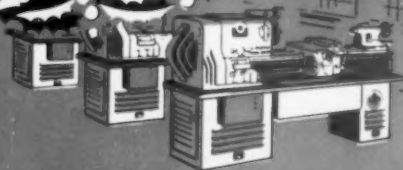
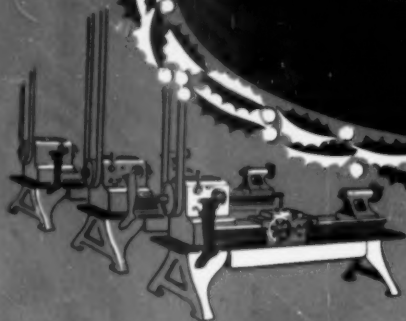
## Automatics

Vertical slides present two facing tools to the piece while the boring tool is in operation. On many jobs such an arrangement can reduce cycle time as much as 50%.

1248HEI



# 'twas the night before Christmas

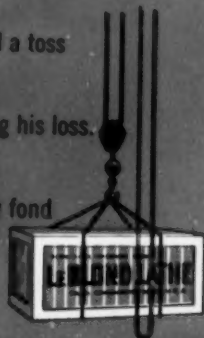


'Twas the night before Christmas  
When all through the shop  
Not a pulley was turning  
Complete was the stop.  
And over the tooling  
The workmen with care  
Had hung up their socks  
Hoping St. Nick would be there.

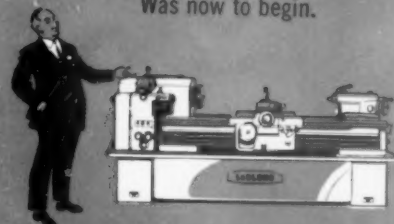


Now the boss in the meantime  
With satisfied glee  
Had a plan of his own  
Of what was to be.  
To speed up his plant  
And loosen the spell  
That tied up production  
And profits as well.

So quick as a flash  
With a heave and a toss  
He threw out the lathes  
That were causing his loss.  
And in the front door  
With a look really fond  
He pulled in the crates  
Marked "Made by LeBlond."



Then into the places  
That now were made bare  
He set the "LeBlonds"  
With the greatest of care.  
When finished he rose  
With a satisfied grin  
For the very best Christmas  
Was now to begin.



A Christmas to span  
Over many a year.  
A Christmas they'll welcome  
With hearty good cheer.  
"It's the very best gift  
I could give them," said he,  
"The one gift that pleases  
Both workmen and me."



Just wait 'til the boys now  
Go back to the line.  
They'll trim every record  
For product and time.  
Economically smart . . .  
It is foresighted thrift.  
The mark of a genius,  
In short . . . It's a gift.

